Drawings and Documents

Attachment 51 – Appendix 9

Low Activity Waste Building

Index

Attachment 51 – Appendix 9.1
Low Activity Waste Building
Process Flow Diagram

Where information regarding treatment, management, and disposal of the radioactive source, byproduct material, and/or special nuclear components of mixed waste (as defined by the Atomic Energy Act of 1954, as amended) has been incorporated into this permit, it is not incorporated for the purpose of regulating the radiation hazards of such components under the authority of this permit and chapter 70.105 RCW. In the event of any conflict between Permit Condition III.10.A. and any statement relating to the regulation of source, special nuclear, and byproduct material contained in portions of the permit application that are incorporated into this permit, Permit Condition III.10.A. will prevail.

Additional appendices will be added to this appendix as new information is incorporated into this permit.

Drawings and Documents

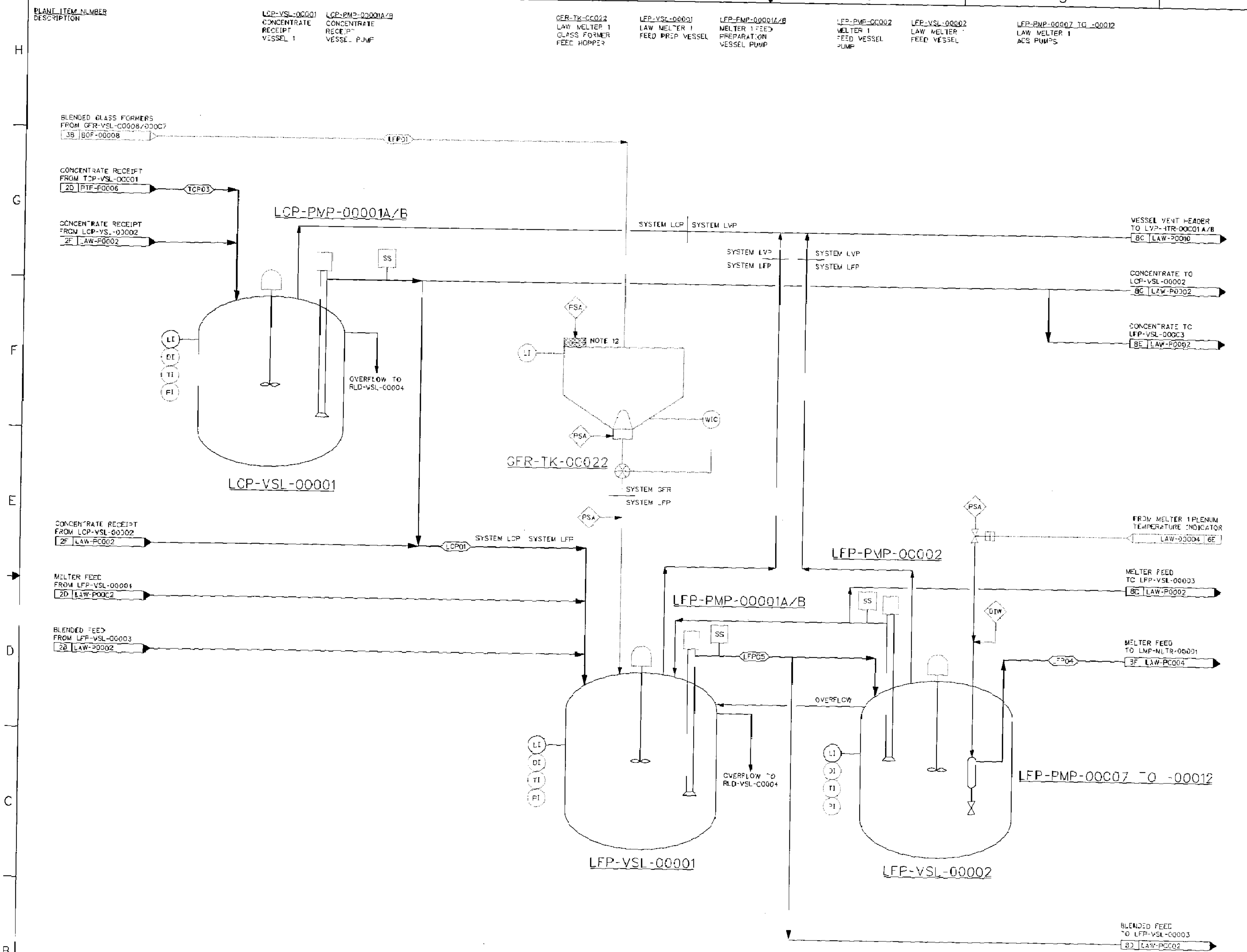
Attachment 51 – Appendix 9.1

Low Activity Waste Building
Process Flow Diagrams

The following drawings have been incorporated into Appendix 9.1 and can be viewed at the Ecology Richland Office. **New drawings are in bold lettering**.

Drawing/Document Number	**Description**
24590-LAW-M5-V17T-P0001, Rev 0	Process Flow Diagram (LCP, GFR, & LFP Systems)
24590-LAW-M5-V17T-P0002, Rev 0	Process Flow Diagram (LCP, GFR, & LFP Systems)
24590-LAW-M5-V17T-P0007, Rev 0	Process Flow Diagram (Melter 1 LOP System)
24590-LAW-M5-V17T-P0008, Rev 0	Process Flow Diagram (Melter 2 LOP System)
24590-LAW-M5-V17T-P0010, Rev 2	**Process Flow Diagram (AMR & LVP Systems)**
24590-LAW-M5-V17T-P0011, Rev 1	**Process Flow Diagram (LVP System)**
24590-LAW-M5-V17T-P0014, Rev 1	Process Flow Diagram (RLD & NLD Systems)
RESERVED	RESERVED

24590-LAW-M5-V17T-P0001



NOTES:

1. (DELETED)
2. MAJOR INDICATION AND CONTROL INSTRUMENTATION ONLY SHOWN
3. VALVES SHOWN ONLY TO INDICATE PROCESS INTENT
4. (DELETED)
5. (DELETED)
6. (DELETED)
7. (DELETED)
8. (DELETED)
9. CONTENTS OF THIS DRAWING ARE DANGEROUS WASTE PERMIT AFFECTING
10. (DELETED)
11. VESSELS MUST HAVE THE CAPABILITY TO BE WASHED AND TO TRANSFER THE WASH EFFLUENT OR OFF-SPECIFICATION MATERIAL TO RLD-VSL-00003.
12. HOPPER FILTERS VENT TO ATMOSPHERE OUTSIDE HOPPERS
13. THE PORTIONS OF THIS DRAWING SHOWN IN PHANTOM ARE CONSIDERED NON-PERMIT AFFECTING AND ARE NOT SUBJECT TO THE REGULATORY REQUIREMENTS OF THE WAC CODE FOR THE DANGEROUS WASTE PERMIT TO THE EXTENT THAT THOSE PORTIONS DO NOT IMPACT DANGEROUS WASTE AREAS/OPERATIONS.

REFERENCES:

1. (DELETED)
2. (DELETED)
3. (DELETED)
4. (DELETED)
5. (DELETED)
6. (DELETED)
7. (DELETED)
8. (DELETED)
9. (DELETED)

1/5/04

PLEASE NOTE THAT SOURCE, SPECIAL NUCLEAR AND BYPRODUCT MATERIALS, AS DEFINED IN THE ATOMIC ENERGY ACT OF 1954 (AEA), ARE REGULATED AT THE U.S. DEPARTMENT OF ENERGY (DOE) FACILITIES EXCLUSIVELY BY DOE ACTING PURSUANT TO ITS AEA AUTHORITY. DOE ASSERTS, THAT PURSUANT TO THE AEA, IT HAS SOLE AND EXCLUSIVE RESPONSIBILITY AND AUTHORITY TO REGULATE SOURCE, SPECIAL NUCLEAR, AND BYPRODUCT MATERIALS AT DOE-OWNED NUCLEAR FACILITIES. INFORMATION CONTAINED HEREIN ON RADIONUCLIDES IS PROVIDED FOR PROCESS DESCRIPTION PURPOSES ONLY.

ISSUED BY RPP-WTP PDC

REV	DESCRIPTION	ORG	CHKD	RVWD	APVD	DATE
0	ISSUED FOR PERMITTING USE					1/5/04

REVISION HISTORY

ISSUE STAMP	PROJECT No.	24590	
	SITE	HANFORD	
	AREA	200E	
	BUILDING No.	20	
	BY		DATE
ORIGINATOR			12/17/03
CHECKER			12/17/03
APPROVER			1/5/04
REVIEWER			12/17/03

CONTENT APPLICABLE TO ALARA? YES NO
ADR NO. REV:

BECHTEL
RIVER PROTECTION PROJECT
WASTE TREATMENT PLANT
2435 STEVENS CENTER PLACE
RICHLAND, WA 99352

CONTRACT No: DE-AC27-01RV14136

PROCESS FLOW DIAGRAM LAW MELTER 1 RECEIPT & FEED PREPARATION (SYSTEM LCP, GFR, AND LFP)

SCALE: NTS

24590-LAW-M5-V17T-P0001

REV 0

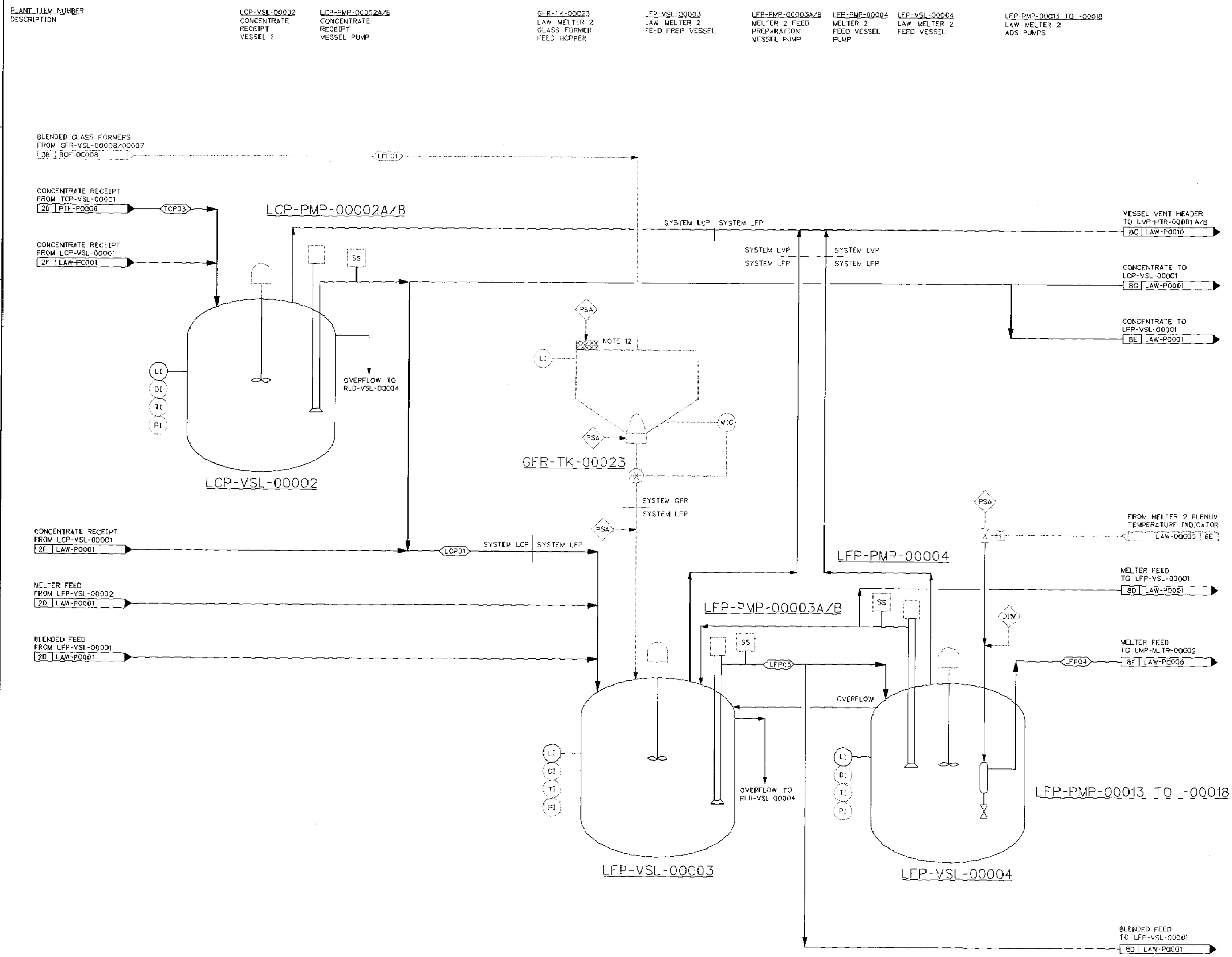
"E" SIZE - 44x34
COMPUTER GENERATED - MANUAL CHANGES NOT PERMITTED

12/17/2003

PLOTTED BY: makufahl
C:\Work\dms06004\24590-LAW-M5-V17T-P0001.dgn

FORM E-3001 EDN 02/2003

24590-LAW-M5-V17T-P0002



NOTES:

1. (DELETED)
2. MAJOR INDICATION AND CONTROL INSTRUMENTATION ONLY SHOWN
3. VALVES SHOWN ONLY TO INDICATE PROCESS INTENT
4. (DELETED)
5. (DELETED)
6. (DELETED)
7. (DELETED)
8. (DELETED)
9. CONTENTS OF THIS DRAWING ARE DANGEROUS WASTE PERMIT AFFECTING
10. (DELETED)
11. VESSELS MUST HAVE THE CAPABILITY TO BE WASHED AND TO TRANSFER THE WASH EFFLUENT OR OFF-SPECIFICATION MATERIAL TO RLD-VSL-00003.
12. HOPPER FILTERS VENT TO ATMOSPHERE OUTSIDE HOPPERS
13. THE PORTIONS OF THIS DRAWING SHOWN IN PHANTOM ARE CONSIDERED NON-PERMIT AFFECTING AND ARE NOT SUBJECT TO THE REGULATORY REQUIREMENTS OF THE WAC CODE FOR THE DANGEROUS WASTE PERMIT TO THE EXTENT THAT THOSE PORTIONS DO NOT IMPACT DANGEROUS WASTE AREAS/OPERATIONS.

REFERENCES:

1. (DELETED)
2. (DELETED)
3. (DELETED)
4. (DELETED)
5. (DELETED)
6. (DELETED)
7. (DELETED)
8. (DELETED)
9. (DELETED)

PLEASE NOTE THAT SOURCE, SPECIAL NUCLEAR AND BYPRODUCT MATERIALS, AS DEFINED IN THE ATOMIC ENERGY ACT OF 1954 (AEA), ARE REGULATED AT THE U.S. DEPARTMENT OF ENERGY (DOE) FACILITIES EXCLUSIVELY BY DOE ACTING PURSUANT TO ITS AEA AUTHORITY. DOE ASSERTS, THAT PURSUANT TO THE AEA, IT HAS SOLE AND EXCLUSIVE RESPONSIBILITY AND AUTHORITY TO REGULATE SOURCE, SPECIAL NUCLEAR, AND BYPRODUCT MATERIALS AT DOE-OWNED NUCLEAR FACILITIES. INFORMATION CONTAINED HEREIN ON RADIONUCLIDES IS PROVIDED FOR PROCESS DESCRIPTION PURPOSES ONLY.

ISSUED BY RPP-WTP PDC

REV	DESCRIPTION	ORG	CHKD	RVWD	APVD	DATE
0	ISSUED FOR PERMITTING USE					

REVISION HISTORY

PROJECT No.	24590	
SITE	HANFORD	
AREA	20CE	
BUILDING No.	20	
	BY	DATE
ORIGINATOR		12/17/03
CHECKER		12/17/03
APPROVER		1/5/04
REVIEWER		12/17/03

ISSUE STAMP

CONTENT APPLICABLE TO ALARA? YES NO
ADF NO. REV:

RIVER PROTECTION PROJECT
WASTE TREATMENT PLANT
2435 STEVENS CENTER PLACE
RICHLAND, WA 99352

CONTRACT No: DE-AC27-01RV14136

PROCESS FLOW DIAGRAM LAW MELTER 2 RECEIPT & FEED PREPARATION (SYSTEM LCP, GFR, AND LFP)

SCALE: NTS

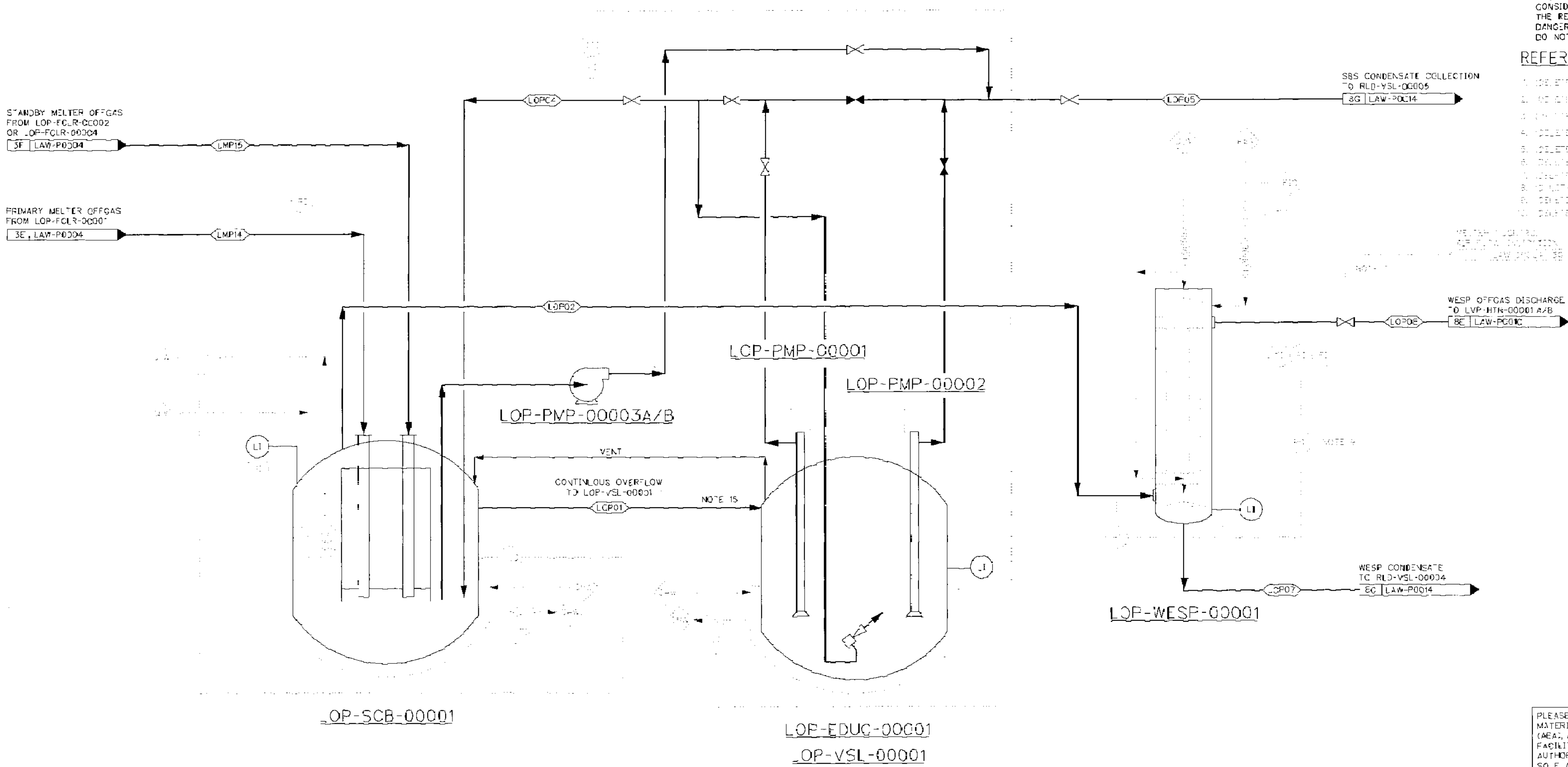
24590-LAW-M5-V17T-P0002 REV 0

"E" SIZE - 44x34
COMPUTER GENERATED - MANUAL CHANGES NOT PERMITTED

12/17/2003 09:01:11 AM

PLOTTED BY: makofahl
C:/Work/dms06004\24590-LAW-M5-V17T-P0002.dgn

PLANT ITEM NUMBER	LOP-SCB-00001	LOP-PMP-00003A/B	LOP-PMP-00001	LOP-VSL-00001	LOP-EDUC-00001	LOP-PMP-00002	LOP-WESP-00001
DESCRIPTION	MELTER 1 SUBMERGED BED SCRUBBER (SBS)	MELTER 1 SBS WATER PURGE PUMP	MELTER 1 SBS CONDENSATE PURGE PUMP	MELTER 1 SBS CONDENSATE VESSEL	MELTER 1 SBS CONDENSATE MIXING EDUCTOR	MELTER 1 SBS CONDENSATE PURGE PUMP	LAW MELTER 1 WET ELECTROSTATIC PRECIPITATOR (WESP)



NOTES:

8. CONTENTS OF THIS DRAWING ARE DANGEROUS WASTE PERMIT AFFECTING

15. TWO OVERFLOW LINES REQUIRED.

16. THE PORTIONS OF THIS DRAWING SHOWN IN PHANTOM ARE CONSIDERED NON-PERMIT AFFECTING AND ARE NOT SUBJECT TO THE REGULATORY REQUIREMENTS OF THE WAC CODE FOR THE DANGEROUS WASTE PERMIT TO THE EXTENT THAT THOSE PORTIONS DO NOT IMPACT DANGEROUS WASTE AREAS/OPERATIONS.

REFERENCES:

PLEASE NOTE THAT SOURCE, SPECIAL NUCLEAR AND BYPRODUCT MATERIALS, AS DEFINED IN THE ATOMIC ENERGY ACT OF 1954 (AEA), ARE REGULATED AT THE U.S. DEPARTMENT OF ENERGY (DOE) FACILITIES EXCLUSIVELY BY DOE ACTING PURSUANT TO ITS AEA AUTHORITY. DOE ASSERTS, THAT PURSUANT TO THE AEA, IT HAS SOLE AND EXCLUSIVE RESPONSIBILITY AND AUTHORITY TO REGULATE SOURCE, SPECIAL NUCLEAR, AND BYPRODUCT MATERIALS AT DOE-OWNED NUCLEAR FACILITIES. INFORMATION CONTAINED HEREIN ON RADIONUCLIDES IS PROVIDED FOR PROCESS DESCRIPTION PURPOSES ONLY.

REV	DESCRIPTION	ORG	CHKD	RVWD	APVD	DATE
0	ISSUED FOR PERMITTING USE					2/3/04

REVISION HISTORY

ISSUED BY RPP-WTP PDC 2-3-04
ISSUE STAMP

PROJECT No.	24590
SITE	HANFORD
AREA	200E
BUILDING No.	20

	BY	DATE
ORIGINATOR		3 Feb 2004
CHECKER		2/3/04
APPROVER		2/3/04
REVIEWER		2/3/04

CONTENT APPLICABLE TO ALARA? [ ] YES [ ] NO
ADR NO: REV:

BECHTEL
RIVER PROTECTION PROJECT
WASTE TREATMENT PLANT
2435 STEVENS CENTER PLACE
RICHLAND, WA 99352

CONTRACT No: DE-AC27-01RV14136

PROCESS FLOW DIAGRAM MELTER 1 PRIMARY OFFGAS TREATMENT SYSTEM (SYSTEM LOP)

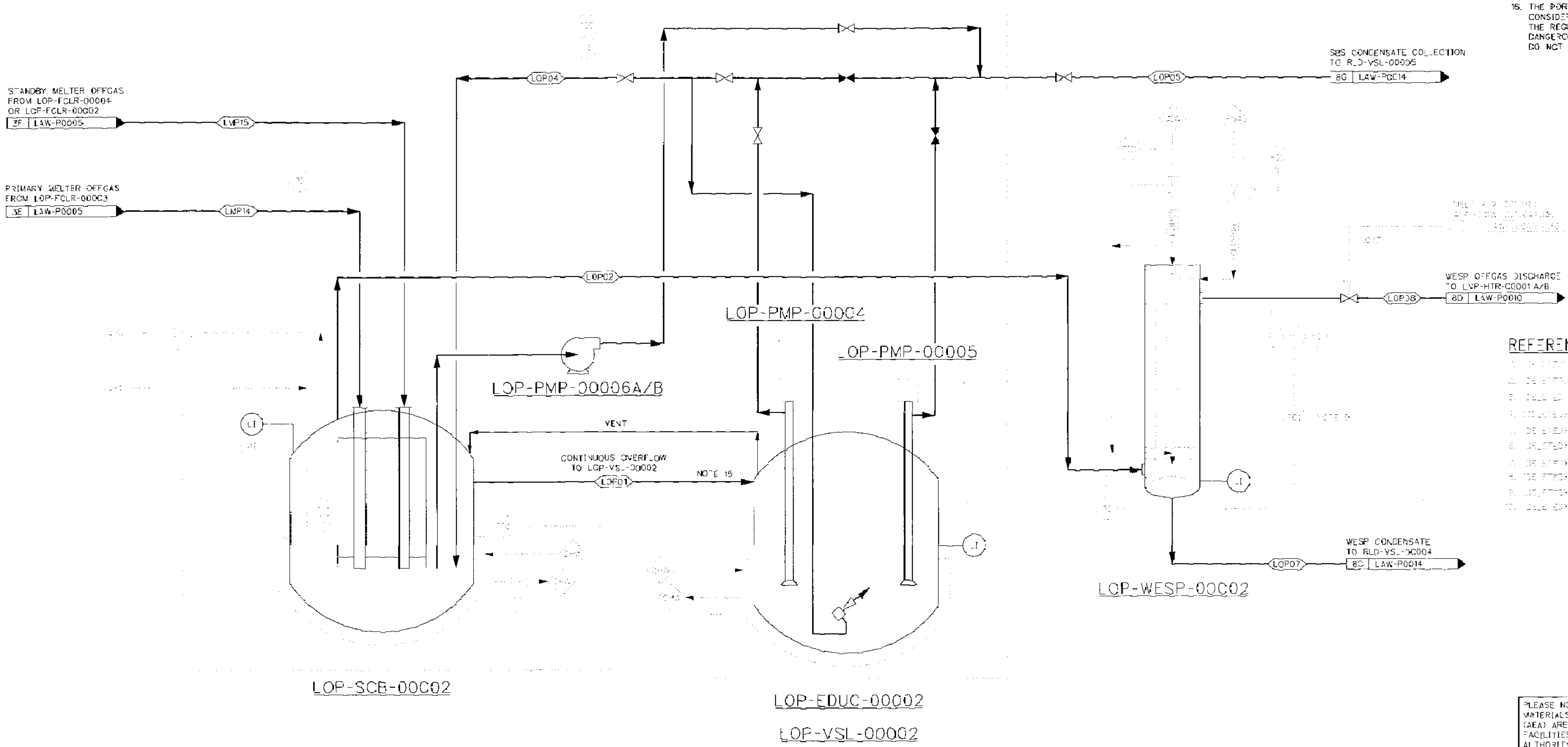
SCALE
24590-LAW-M5-V17T-P0007
REV 0

E SIZE - 44x34
COMPUTER GENERATED - MANUAL CHANGES NOT PERMITTED

02/03/2004 07:59:52 AM

PLANT ITEM NUMBER
DESCRIPTION

LOP-SCB-00002	LOP-PMP-00006A/B	LOP-PMP-00004	LOP-VSL-00002	LOP-EDUC-00002	LOP-PMP-00005	LOP-WESP-00002
MELTER 2 SUBMERGED BED SCRUBBER (SBS)	MELTER 2 SBS WATER PURGE PUMP	MELTER 2 SBS CONDENSATE PURGE PUMP	MELTER 2 SBS CONDENSATE VESSEL	MELTER 2 SBS CONDENSATE MIXING EDUCTOR	MELTER 2 SBS CONDENSATE PURGE PUMP	LAW MELTER 2 WET ELECTROSTATIC PRECIPITATOR (WESP)



NOTES:

8. CONTENTS OF THIS DRAWING ARE DANGEROUS WASTE PERMIT AFFECTING

15. TWO OVERFLOW LINES REQUIRED.

16. THE PORTIONS OF THIS DRAWING SHOWN IN PHANTOM ARE CONSIDERED NON-PERMIT AFFECTING AND ARE NOT SUBJECT TO THE REGULATORY REQUIREMENTS OF THE WAC CODE FOR THE DANGEROUS WASTE PERMIT TO THE EXTENT THAT THOSE PORTIONS DO NOT IMPACT DANGEROUS WASTE AREAS/OPERATIONS.

REFERENCES:

PLEASE NOTE THAT SOURCE, SPECIAL NUCLEAR AND BYPRODUCT MATERIALS, AS DEFINED IN THE ATOMIC ENERGY ACT OF 1954 (AEA) ARE REGULATED AT THE U.S. DEPARTMENT OF ENERGY (DOE) FACILITIES EXCLUSIVELY BY DOE ACTING PURSUANT TO ITS AEA AUTHORITY. DOE ASSERTS THAT PURSUANT TO THE AEA, IT HAS SOLE AND EXCLUSIVE RESPONSIBILITY AND AUTHORITY TO REGULATE SOURCE, SPECIAL NUCLEAR, AND BYPRODUCT MATERIALS AT DOE-OWNED NUCLEAR FACILITIES. INFORMATION CONTAINED HEREIN ON RADIONUCLIDES IS PROVIDED FOR PROCESS DESCRIPTION PURPOSES ONLY.

REV	DESCRIPTION	ORG	CHKD	RVWD	APVD	DATE
0	ISSUED FOR PERMITTING USE					2/3/04

REVISION HISTORY

ISSUED BY RPP-WTP PDC
2-3-04
UNIT DATE
ISSUE STAMP

PROJECT No	24590
SITE	HANFORD
AREA	200E
BUILDING No	20

RIVER PROTECTION PROJECT
WASTE TREATMENT PLANT
2435 STEVENS CENTER PLACE
RICHLAND, WA 99352

CONTRACT No: DE-AC27-01RV14136

	BY	DATE
ORIGINATOR		3 Feb 2004
CHECKER		2/3/2004
APPROVER		2/3/04
REVIEWER		2/3/04

CONTENT APPLICABLE TO ALARA? YES NO
ADR NO. REV:

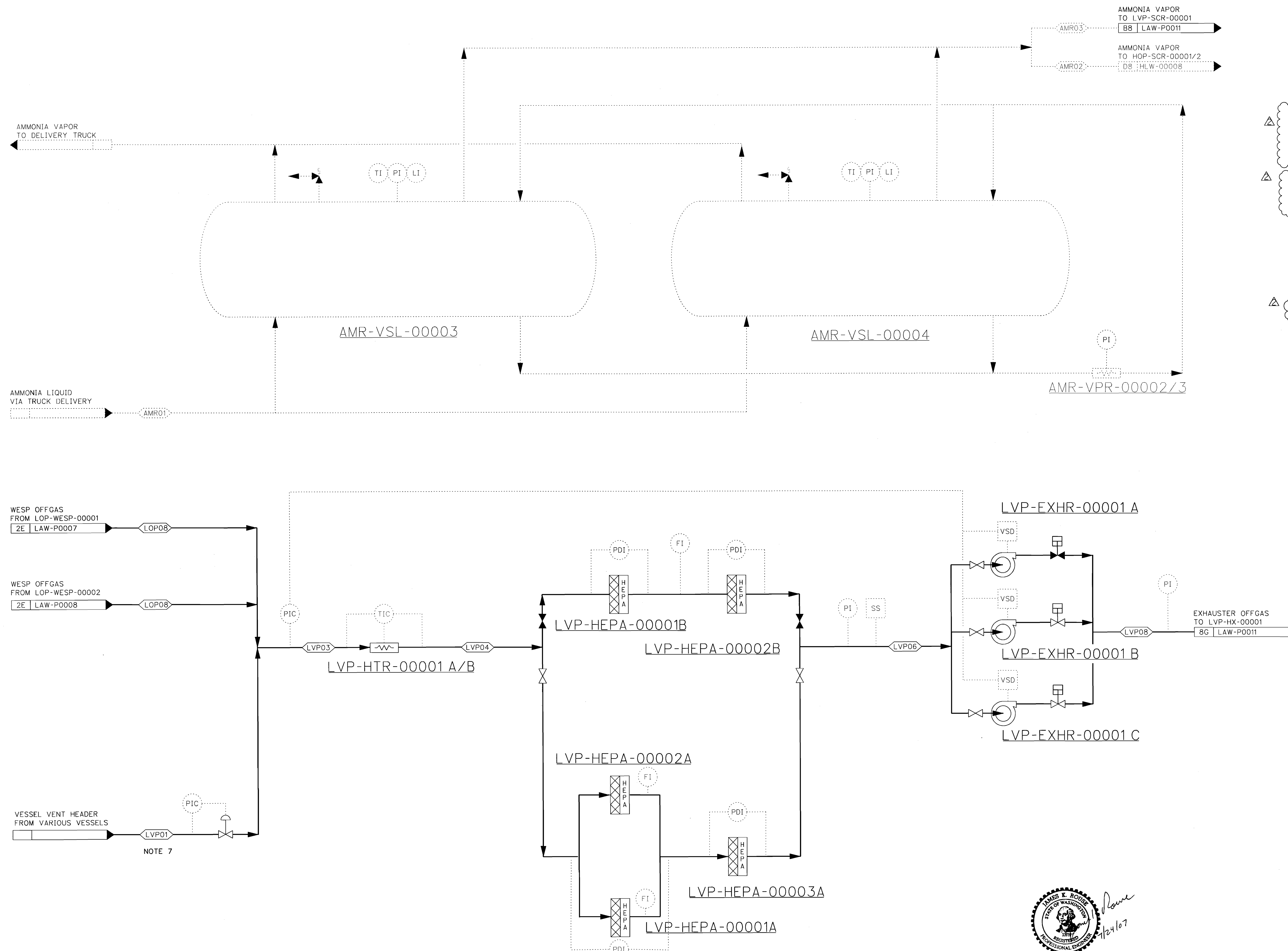
PROCESS FLOW DIAGRAM MELTER 2 PRIMARY OFFGAS TREATMENT SYSTEM (SYSTEM LOP)

SCALE: NTS
24590-LAW-M5-V17T-P0008
REV 0

'E' SIZE - 44x34
COMPUTER GENERATED - MANUAL CHANGES NOT PERMITTED

02/03/2004 08:00:08 AM

PLANT ITEM NUMBER DESCRIPTION	LVP-HTR-00001 A/B	LVP-HEPA-00001A/B	LVP-HEPA-00003A	AMR-VSL-00003/4	LVP-HEPA-00002A/B	AMR-VPR-00002/3	LVP-EXHR-00001 A/B/C
	LAW MELTERS OFFGAS HEPA PREHEATERS	LAW MELTER OFFGAS HEPA	LAW MELTER OFFGAS HEPA	AMMONIA HOLDING VESSEL	LAW MELTER OFFGAS HEPA	AMMONIA VAPORIZATION HEATER	LAW MELTER OFFGAS EXHAUSTERS



NOTES:

1. (DELETED)
2. MAJOR INDICATION AND CONTROL INSTRUMENTATION ONLY SHOWN
3. VALVES SHOWN ONLY TO INDICATE PROCESS INTENT
4. (DELETED)
5. (DELETED)
6. (DELETED)
7. VENT HEADER HAS FLUSH CAPABILITY
8. CONTENTS OF THIS DRAWING ARE DANGEROUS WASTE PERMIT AFFECTING
9. (DELETED)
10. (DELETED)
11. (DELETED)
12. AMR-VSL-00003 & -00004 ARE LOCATED IN THE BOF FACILITY.
13. THE COMPONENTS SHOWN ON THIS DRAWING IN PHANTOM DO NOT REQUIRE INDEPENDENT QUALIFIED REGISTERED PROFESSIONAL ENGINEER ASSESSMENTS OF DESIGN OR INSTALLATION INSPECTIONS BY A QUALIFIED INSTALLATION INSPECTOR IN ACCORDANCE WITH THE DWP AND/OR WASHINGTON ADMINISTRATIVE CODE REQUIREMENTS.
14. THIS REVISION UPDATED NOTE 13 TO COMPLY WITH NEW GUIDANCE. ADDED SYSTEM DESCRIPTION IN REFERENCES. A PERMIT VERSION OF 24590-HLW-M5-V17T-00008 IS NOT PLANNED.

REFERENCES:

1. 24590-LAW-3YD-LOP-00001, "SYSTEM DESCRIPTION FOR LOP AND LVP: LAW MELTER OFFGAS"
2. (DELETED)
3. 24590-WTP-M5-V17T-P0001, "PROCESS FLOW DIAGRAM LEGEND & SYMBOLS"
4. (DELETED)
5. (DELETED)
6. (DELETED)
7. (DELETED)
8. (DELETED)
9. (DELETED)
10. (DELETED)
11. (DELETED)

HOLDS:

1. (DELETED)
2. (DELETED)

PLEASE NOTE THAT SOURCE, SPECIAL NUCLEAR AND BYPRODUCT MATERIALS, AS DEFINED IN THE ATOMIC ENERGY ACT OF 1954 (AEA), ARE REGULATED AT THE U.S. DEPARTMENT OF ENERGY (DOE) FACILITIES EXCLUSIVELY BY DOE ACTING PURSUANT TO ITS AEA AUTHORITY. DOE ASSERTS, THAT PURSUANT TO THE AEA, IT HAS SOLE AND EXCLUSIVE RESPONSIBILITY AND AUTHORITY TO REGULATE SOURCE, SPECIAL NUCLEAR, AND BYPRODUCT MATERIALS AT DOE-OWNED NUCLEAR FACILITIES. INFORMATION CONTAINED HEREIN ON RADIONUCLIDES IS PROVIDED FOR PROCESS DESCRIPTION PURPOSES ONLY.

JAMES E. ROUSE STATE OF WASHINGTON REGISTERED PROFESSIONAL ENGINEER
EXPIRES: 3/5/08
7/24/07

REV	DESCRIPTION	ORG	CHKD	RVWD	APVD	DATE
2	ISSUED FOR PERMITTING USE	NJ	RST	NR		7/24/07
1	ISSUED FOR PERMITTING USE	NW	RH	GRC	RV/JKR	10/11/06
0	ISSUED FOR PERMITTING USE	WFL	RH	SS	KK	01/04/05

REVISION HISTORY

ISSUED BY RPP-WTP PDC

PROJECT No.	24590	
SITE	HANFORD	
AREA	200E	
BUILDING No.	20	
	BY	DATE
ORIGINATOR	WILLIAM F. LENSKE III	01/04/2005
CHECKER	ROBERT HANSON	01/04/2005
APPROVER	KEN KHIANEY	01/04/2005
REVIEWER	SEAN SWEENEY	01/04/2005

CONTENT APPLICABLE TO ALARA? [X] YES [ ] NO
ADR NO. N/A REV:
SAFETY SCREEN REQUIRED? [ ] YES [X] NO EANS INITIAL IF YES

RIVER PROTECTION PROJECT
WASTE TREATMENT PLANT
2435 STEVENS CENTER PLACE
RICHLAND, WA 99354

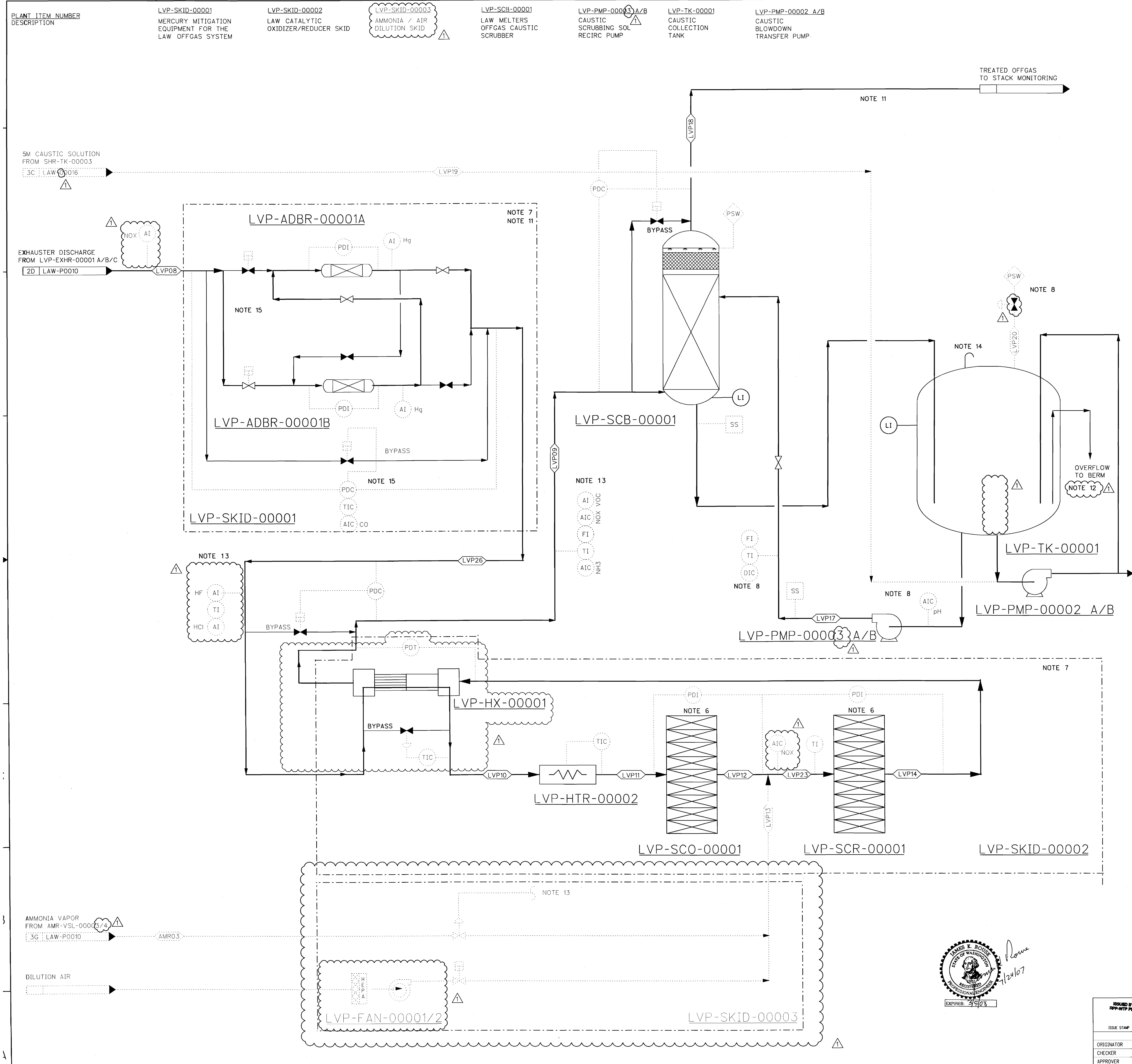
CONTRACT No: DE-AC27-01RV14136

PROCESS FLOW DIAGRAM LAW VITRIFICATION AMMONIA & SECONDARY OFFGAS (SYSTEM AMR & LVP)

SCALE: NTS | 24590-LAW-M5-V17T-P0010 | REV 2

SAFETY SCREEN IS REQUIRED FOR DRAWING TYPES IDENTIFIED IN 24590-WTP-GPP-SREG-002

"E" SIZE - 44x34
COMPUTER GENERATED - MANUAL CHANGES NOT PERMITTED



NOTES:

1. (DELETED)
2. MAJOR INDICATION AND CONTROL INSTRUMENTATION ONLY SHOWN
3. VALVES SHOWN ONLY TO INDICATE PROCESS INTENT
4. (DELETED)
5. (DELETED)
6. VOC AND SCR CATALYST IS SUPPLIED AS A METAL MONOLITH HELD IN FRAMES. CATALYST IS INSERTED AND REMOVED THROUGH ACCESS DOORS.
7. VENDOR SUPPLIED EQUIPMENT IS A SKID MOUNTED UNIT.
8. WATER ADDED TO CONTROL DENSITY, CAUSTIC ADDED TO CONTROL PH
9. (DELETED)
10. CONTENTS OF THIS DOCUMENT ARE DANGEROUS WASTE PERMIT AFFECTING
11. LVP-SKID-00001 MOVED FROM DOWNSTREAM OF LVP-SCB-00001
12. VESSELS MUST HAVE THE CAPABILITY TO BE WASHED AND TO TRANSFER THE WASH EFFLUENT OR OFF-SPECIFICATION MATERIAL TO RLD-VSL-00003 (VIA FLOOR DRAIN LVP-FD-00001).
13. CONTROLLED BY DIFFERENTIAL NOX ACROSS LVP-SKID-00002 OR INLET TEMPERATURE
14. ROUTED TO SAFE LOCATION
15. DIFFERENTIAL TEMP OR CO ALSO ISOLATES INLETS TO CARBON BEDS
16. THE COMPONENTS SHOWN ON THIS DRAWING IN PHANTOM DO NOT REQUIRE INDEPENDENT QUALIFIED REGISTERED PROFESSIONAL ENGINEER ASSESSMENTS OF DESIGN OR INSTALLATION INSPECTIONS BY A QUALIFIED INSTALLATION INSPECTOR IN ACCORDANCE WITH THE DWP AND/OR WASHINGTON ADMINISTRATIVE CODE REQUIREMENTS.
17. THIS REVISION INCORPORATED DCNS ASSOCIATED WITH THE SOURCE DRAWING. LVP-SKID-00003 ADDED PER VENDOR DESIGN. ADDED "FLOOR DRAIN" TO NOTE 12 FOR CLARIFICATION. CHANGED OFFSHEET CONNECTOR FROM "LAW-P0016" TO "LAW-00016". A PERMIT VERSION OF 24590-LAW-M5-V17T-00016 WILL NOT BE ISSUED.

HOLDS:

1. (DELETED)

REFERENCES:

1. 24590-LAW-3YD-LOP-00001, "SYSTEM LOP AND LVP: LAW MELTER OFFGAS SYSTEM DESCRIPTION"
2. 24590-WTP-M5-V17T-P0001, "PROCESS FLOW DIAGRAM LEGENDS & SYMBOLS"
3. (DELETED)
4. (DELETED)
5. (DELETED)
6. (DELETED)
7. (DELETED)
8. (DELETED)
9. (DELETED)
10. (DELETED)
11. (DELETED)

PLEASE NOTE THAT SOURCE, SPECIAL NUCLEAR AND BYPRODUCT MATERIALS, AS DEFINED IN THE ATOMIC ENERGY ACT OF 1954 (AEA), ARE REGULATED AT THE U.S. DEPARTMENT OF ENERGY (DOE) FACILITIES EXCLUSIVELY BY DOE ACTING PURSUANT TO ITS AEA AUTHORITY. DOE ASSERTS THAT, PURSUANT TO THE AEA, IT HAS SOLE AND EXCLUSIVE RESPONSIBILITY AND AUTHORITY TO REGULATE SOURCE, SPECIAL NUCLEAR, AND BYPRODUCT MATERIALS AT DOE-OWNED NUCLEAR FACILITIES. INFORMATION CONTAINED HEREIN ON RADIONUCLIDES IS PROVIDED FOR PROCESS DESCRIPTION PURPOSES ONLY.

REV	DESCRIPTION	ORG	CHKD	RVWD	APVD	DATE
1	ISSUED FOR PERMITTING USE	NW	RS			7/24/07
0	ISSUED FOR PERMITTING USE	MK	SC	RH	KK	07/13/2004

REVISION HISTORY

ISSUED BY RPP-WTP PDC		
ISSUE STAMP	PROJECT No.	24590
	SITE	HANFORD
	AREA	200E
	BUILDING No.	20

RIVER PROTECTION PROJECT
WASTE TREATMENT PLANT
2435 STEVENS CENTER PLACE
RICHLAND, WA 99354

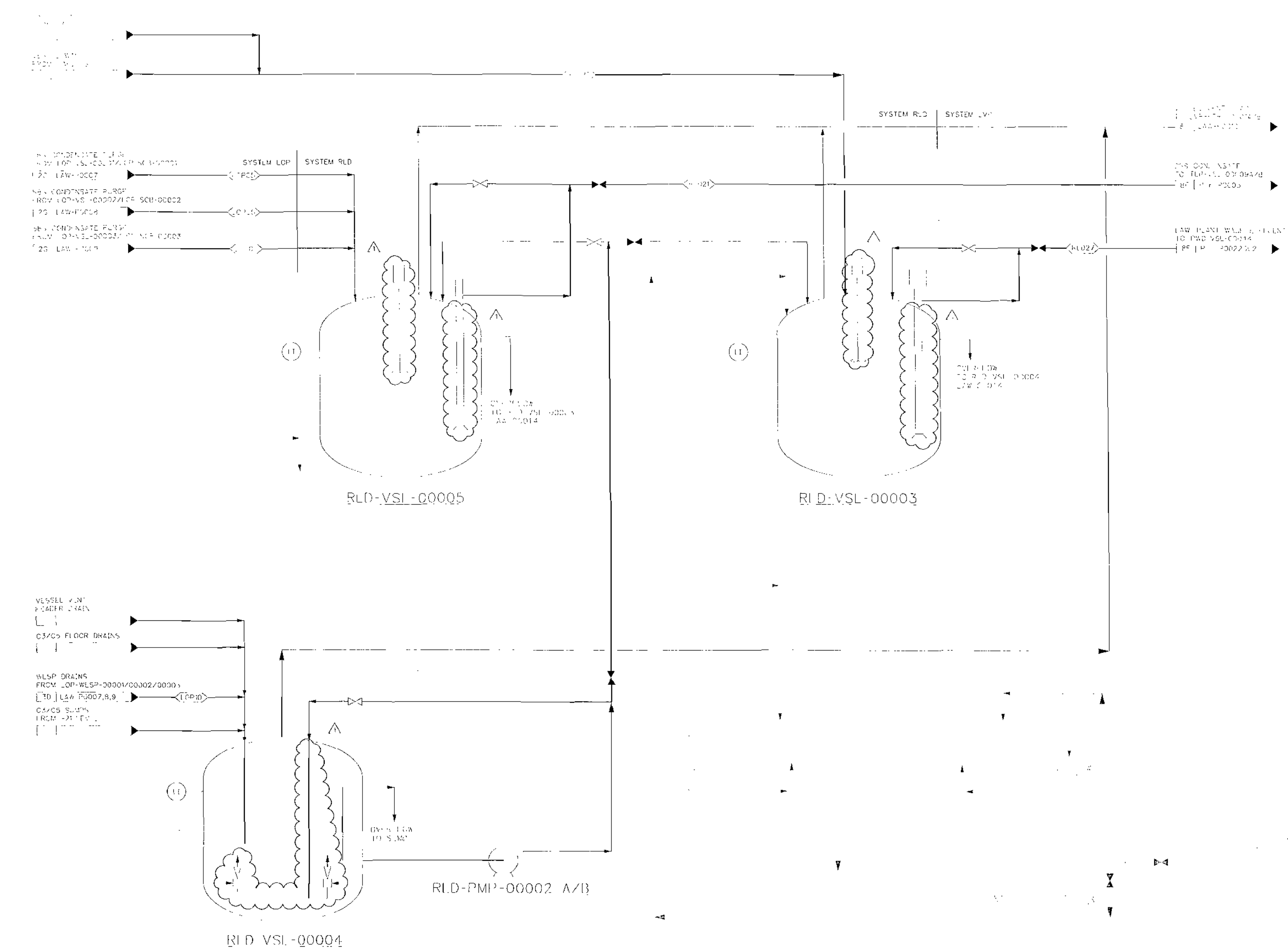
CONTRACT No: DE-AC27-01RV14136

	BY	DATE
ORIGINATOR	KIZERIAN, MATTHEW	07/09/2004
CHECKER	COLBY, SCOTT	07/12/2004
APPROVER	KHIANEY, KEN	07/13/2004
REVIEWER	HANSON, ROBERT	07/12/2004

PROCESS FLOW DIAGRAM LAW VIT SECONDARY OFFGAS TREATMENT (SYSTEM LVP)

CONTENT APPLICABLE TO ALARA? [X] YES [ ] NO
ADR NO. N/A REV:
SAFETY SCREEN REQUIRED? [ ] YES [X] NO E&NS INITIAL IF YES ____

SCALE: NTS | 24590-LAW-M5-V17T-P0011 | REV 1



NOTES:

1. SEE DRAWING 24590-PTF-M5-V17T-P0001 FOR SYMBOLS AND LEGEND
2. MAJOR INDICATION AND CONTROL INSTRUMENTATION ONLY SHOWN.
3. VALVES SHOWN ONLY TO INDICATE PROCESS INTENT
4. PROCESS STREAM NUMBERS BASED ON 24590-WTP-RPT-ENG-01-004,
5. THE PORTIONS OF THIS DRAWING SHOWN IN PHANTOM ARE CONSIDERED NON-PERMIT AFFECTING AND ARE NOT SUBJECT TO REGULATORY REQUIREMENTS OF THE WAC CODE FOR THE DANGEROUS WASTE PERMIT TO THE EXTENT THAT THOSE PROTIONS DO NOT IMPACT DANGEROUS WASTE AREAS/OPERATIONS.

REVISION HISTORY

PROCESS FLOW DIAGRAM
LAW LIQUID EFFLUENT
(SYSTEM RLD & NLD)

24590-LAW-M5-V17T-P0014 1

Attachment 51 – Appendix 9.2
Low Activity Waste Building
Piping and Instrumentation Diagrams

Where information regarding treatment, management, and disposal of the radioactive source, byproduct material, and/or special nuclear components of mixed waste (as defined by the Atomic Energy Act of 1954, as amended) has been incorporated into this permit, it is not incorporated for the purpose of regulating the radiation hazards of such components under the authority of this permit and chapter 70.105 RCW. In the event of any conflict between Permit Condition III.10.A. and any statement relating to the regulation of source, special nuclear, and byproduct material contained in portions of the permit application that are incorporated into this permit, Permit Condition III.10.A. will prevail.

Additional appendices will be added to this appendix as new information is incorporated into this permit.

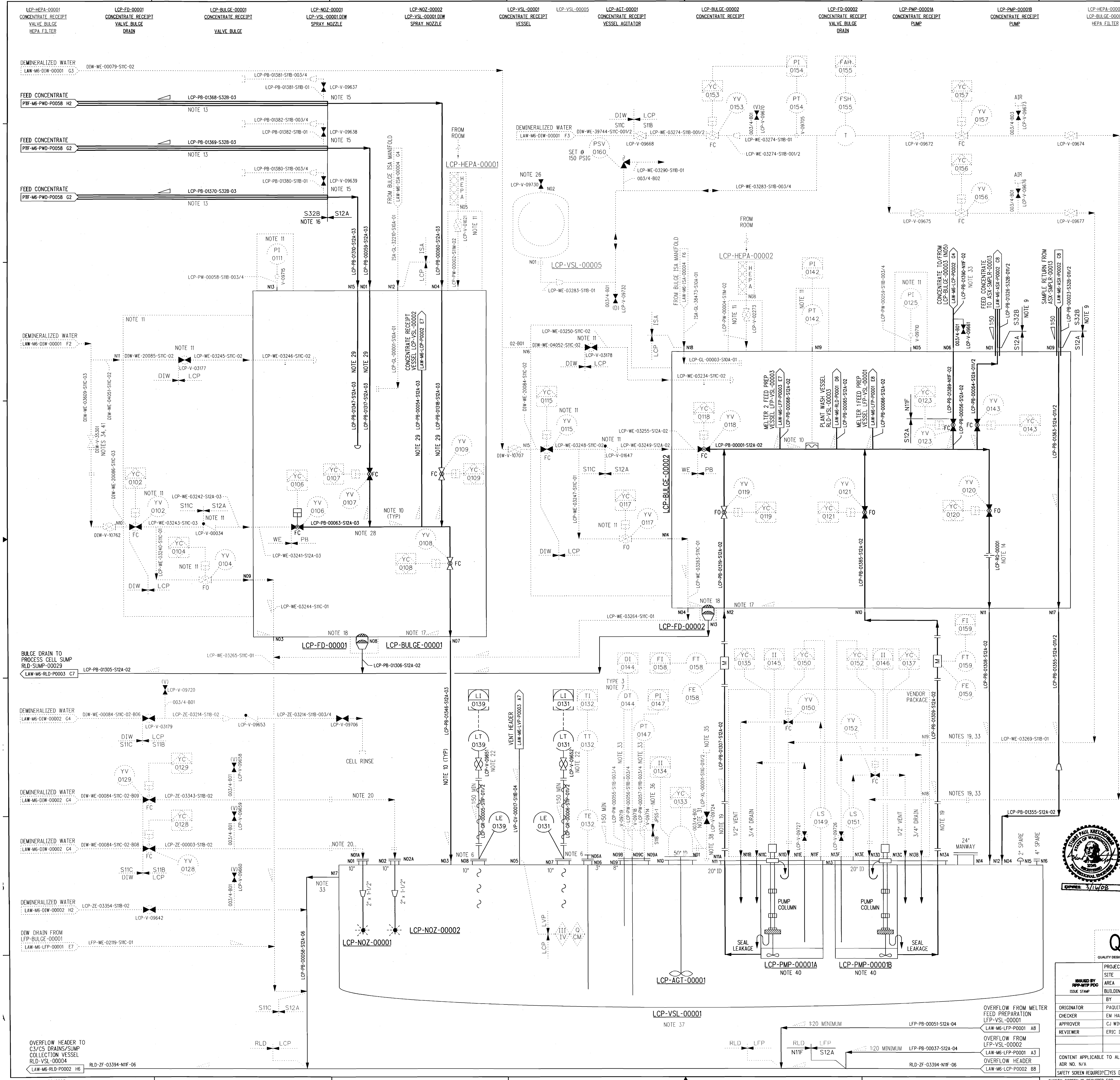
Drawings and Documents

Attachment 51 – Appendix 9.2

Low Activity Waste Building
Piping and Instrumentation Diagrams

The following drawings have been incorporated into Appendix 9.2 and can be viewed at the Ecology Richland Office. **New drawings are in bold lettering**.

Drawing/Document Number	**Description**
24590-LAW-M6-LCP-P0001, Rev 3	**Piping &Instrumentation Diagram Concentrate Receipt Process System Concentrate Receipt Vessel (LCP-VSL-00001)**
24590-LAW-M6-LCP-P0002, Rev 2	**Piping & Instrumentation Diagram Concentrate Receipt Process System Concentrate Receipt Vessel (LCP-VSL-00002)**
24590-LAW-M6-LFP-P0001, Rev 2	**Piping &Instrumentation Diagram Melter Feed Process System Melter 1 Feed Preparation and Feed**
24590-LAW-M6-LFP-P0003, Rev 2	**Piping & Instrumentation Diagram Melter Feed Process System Melter 2 Feed Preparation and Feed**
24590-LAW-M6-LOP-P0001, Rev 2	**Piping & Instrumentation Diagram Primary Offgas Process System Melter 1**
24590-LAW-M6-LOP-P0002, Rev 2	**Piping & Instrumentation Diagram Primary Offgas Process System Melter 2**
24590-LAW-M6-LVP-P0001, Rev 0	Piping & Instrument Diagrams Secondary Offgas/Vessel Vent Process System Melters Secondary Offgas
24590-LAW-M6-LVP-P0002, Rev 2	Piping & Instrument Diagrams Secondary Offgas/Vessel Vent Process System and Stack Discharge Monitoring System
24590-LAW-M6-LVP-P0003, Rev 0	Piping & Instrument Diagrams Secondary Offgas Vessel Vent Process System Equipment Vents
24590-LAW-M6-LVP-P0004, Rev 0	Piping & Instrument Diagrams Melters Secondary Offgas, Vessel Vent Process System Mercury Mitigation Equipment
24590-LAW-M6-LVP-P0005, Rev 0	Piping & Instrument Diagrams (LVP System) Melters Secondary Offgas Vessel Vent Process System SCR, VOC & Ammonia Dilution Packages
24590-LAW-M6-RLD-P0001, Rev 2	Piping & Instrumentation Diagram Radioactive Liquid Waste Disposal System Plant Wash & SBS Condensate Collection
24590-LAW-M6-RLD-P0002, Rev 2	Piping &Instrumentation Diagram Radioactive Liquid Waste Disposal System C3/C5 Drains Sump Collection
24590-LAW-M6-RLD-P0003, Rev 2	**Piping & Instrumentation Diagram Radioactive Liquid Waste Disposal System C3/C5 Floor Drains Collection**
24590-WTP-PEN-ENV-03-003	Equivalency Notice for 24590-LAW-M6-LCP-P0001, & 24590-LAW-M6-LCP-P0002
RESERVED	RESERVED



NOTES:

1. SEE DRAWINGS 24590-WTP-M6-50-P0001 THROUGH 24590-WTP-M6-50-P0008 FOR GENERAL NOTES, SYMBOLS AND LEGEND, AND GENERAL SLOPE REQUIREMENTS.
2. THE PRESSURE BOUNDARY FOR ALL SYSTEMS, STRUCTURES, AND COMPONENTS SHOWN ON THIS DRAWING IS QUALITY LEVEL CM AND SEISMIC CATEGORY SC-IV UNLESS OTHERWISE NOTED.

3-5. DELETED

6. RADAR GUIDE TUBE IS TO BE ROUTED TO THE FLOOR ABOVE.
7. PROVISION FOR FLUSHING USING DEMINERALIZED WATER IS REQUIRED.
8. DELETED
9. OUTER PIPE DRAINS INTO LCP-BULGE-00002.
10. WHERE SLOPE IS DESIGNATED ON PIPING, SLOPE 1:200 MINIMUM UNLESS OTHERWISE NOTED.
11. ITEMS INSIDE THE BULGE AND INSIDE DASHED LINES EXTENDING OUTSIDE THE BULGE ARE PROVIDED BY VENDOR.
12. DELETED
13. BOF IS RESPONSIBLE FOR PIPING BETWEEN LAW AND PRETREATMENT FACILITIES, STARTING AT FIVE FEET OUTSIDE THE LAW FACILITY.
14. WELDED RESTRICTION ORIFICE MACHINED FROM BAR STOCK.
15. LOCATE HOSE CONNECTION IN CORRIDOR AT ELEVATION 3'-0".
16. DOUBLE-WALLED PIPING SPECIFICATION TERMINATES INSIDE THE PROCESS CELL ABOVE FLOOR ELEVATION 3'-0".
17. SLOPE BULGE FLOOR 1:100 TOWARDS THE DRAIN.
18. STRAINER IS DESIGNED FOR MECHANICAL REMOVAL FROM THE BULGE EXTERIOR.
19. SPOOL PIECE TO FACILITATE PUMP REMOVAL.
20. SPOOL PIECE TO FACILITATE SPRAY NOZZLE REMOVAL.
21. CONTENTS OF THIS DOCUMENT ARE DANGEROUS WASTE PERMIT AFFECTING.
22. FULL PORT BALL VALVE REQUIRED ON THE RADAR GUIDE TUBES.

23-25. DELETED

26. AIR CHARGING VALVE PROVIDED WITH EXPANSION VESSEL BY VENDOR.
27. DELETED
28. VENDOR TO PROVIDE 3" SCH 80 PIPING FOR THE SECTION OF PIPING CONNECTING YV-0106 TO YV-0108.
29. PIPE SHIELDING FOR THE VERTICAL PIPE SHALL BE 4" SCH 80.
30. DELETED
31. LOCATE VALVE ABOVE EL. 28'-0". FULL PORT VALVE REQUIRED.
32. DELETED
33. DO NOT POCKET.
34. SPOOL IS FOR THE ADDITION OF SIMULANT.
35. THIS CONNECTION ALLOWS MAINTENANCE ACCESS FROM 28'-0" FLOOR ELEVATION FOR AGITATOR OIL CHANGE. A CART-MOUNTED OIL SUCTION DEVICE WILL BE USED.
36. JPSS-1 IS DEFINED IN INSTRUMENT PIPING MATERIAL CLASS SPEC NO 24590-WTP-3PS-JXFO-T0001.
37. THE SEISMIC RESTRAINT FOR LCP-VSL-00001 IS SEISMIC CATEGORY SC-III.
38. OIL COLLECTION LEG EXTENDS MIN 3 IN. BELOW OIL DRAIN/REFILL NOZZLE.
39. DELETED
40. THIS IS A CONCENTRATE RECEIPT PUMP SYMBOL.
41. SPOOL CONNECTION FOR THE INJECTION OF PRESSURIZED WATER/CHEMICALS TO CLEAR LINE PLUG UPS. THE SPOOL LENGTH SHALL ACCOMMODATE THE LENGTH OF A TEE WITH FLANGES MATCHING THE PIPE SIZE.
42. THE COMPONENTS SHOWN ON THIS DRAWING IN PHANTOM DO NOT REQUIRE INDEPENDENT QUALIFIED REGISTERED PROFESSIONAL ENGINEER ASSESSMENTS OF DESIGN OR INSTALLATION INSPECTIONS BY A QUALIFIED INSTALLATION INSPECTOR IN ACCORDANCE WITH THE DWP AND/OR WASHINGTON ADMINISTRATIVE CODE REQUIREMENTS.
43. THE DOCUMENT WAS COMPLETELY REVISED AND IDENTIFICATION OF REVISED ITEM IS NOT NECESSARY. REVISED PER 24590-LAW-M6N-LCP-00006, 00008, 00012, 00015, 00017, 00018, 00021, 00022, 24590-LAW-M6PR-LCP-00001 AND 24590-LAW-M6N-M80T-00001. ADDED MAGNETIC FLOW METER TO LCP PUMP DISCHARGE LINES. ADDED SLOPE SYMBOLS, INSTRUMENT SERVICE AIR FROM ISA MANIFOLD TO BULGE. DELETED SEISMIC CATEGORY FLAGS AND INCORPORATED VARIOUS EDITORIAL COMMENTS.

HOLD/OPEN ITEMS:

1-6. DELETED

REFERENCES:

1. THE REQUIRED BATCH SEQUENCES, PERMISSIVES, INTERLOCKS, ALARMS AND OPERATOR INTERFACE POINTS ARE FULLY DESCRIBED IN THE SOFTWARE FUNCTIONAL SPECIFICATION FOR LCP CONCENTRATE RECEIPT PROCESS SYSTEM, 24590-LAW-3PS-LCP-T0001.
2. 24590-LAW-M5-V17T-P0001, PROCESS FLOW DIAGRAM LAW CONCENTRATE RECIEPT AND MELTER 1 FEED (SYSTEM LCP, GFR, AND LFP).

STUART PAUL KRETZSCHMAR STATE OF WASHINGTON 32345 REGISTERED PROFESSIONAL ENGINEER 7/12/07
EXPIRES: 3/16/08

PLEASE NOTE THAT SOURCE, SPECIAL NUCLEAR AND BYPRODUCT MATERIALS, AS DEFINED IN THE ATOMIC ENERGY ACT OF 1954 (AEA), ARE REGULATED AT THE U.S. DEPARTMENT OF ENERGY (DOE) FACILITIES EXCLUSIVELY BY DOE ACTING PURSUANT TO ITS AEA AUTHORITY. DOE ASSERTS, THAT PURSUANT TO THE AEA, IT HAS SOLE AND EXCLUSIVE RESPONSIBILITY AND AUTHORITY TO REGULATE SOURCE, SPECIAL NUCLEAR, AND BYPRODUCT MATERIAL AT DOE-OWNED NUCLEAR FACILITIES. INFORMATION CONTAINED HEREIN ON RADIONUCLIDES IS PROVIDED FOR PROCESS DESCRIPTION PURPOSES ONLY.

REV	DESCRIPTION	ORG	CHKD	RVWD	APVD	DATE
3	ISSUED FOR PERMITTING USE	LCS	EH	EI	JJ	7/12/07
2	ISSUED FOR PERMITTING USE	MS	EH	EI	CJW	4/29/04
1	ISSUED FOR PERMITTING USE	PSH	EH	EI	CW	12/21/03
0	ISSUED FOR PERMITTING USE	PSH	EH	EI	CW	7/30/03

Q
QUALITY DESIGNATOR

REVISION HISTORY

ISSUED BY RPP-WTP PDC
ISSUE STAMP

PROJECT No.	24590
SITE	HANFORD
AREA	200E
BUILDING No.	20

	BY	DATE
ORIGINATOR	PAQUITO S. HOLGADO	7/24/03
CHECKER	EM HAN	7/24/03
APPROVER	CJ WINKLER	7/30/03
REVIEWER	ERIC ISERN	7/28/03

CONTENT APPLICABLE TO ALARA? [X] YES [ ] NO
ADR NO. N/A REV: N/A
SAFETY SCREEN REQUIRED? [ ] YES [X] NO E&NS INITIAL IF YES ____

BECHTEL
RIVER PROTECTION PROJECT
WASTE TREATMENT PLANT
2435 STEVENS CENTER PLACE
RICHLAND, WA 99354

CONTRACT No: DE-AC27-01RV14136

P&ID - LAW CONCENTRATE RECEIPT PROCESS SYSTEM CONCENTRATE RECEIPT VESSEL LCP-VSL-00001

SCALE: NONE
24590-LAW-M6-LCP-P0001
REV 3

SAFETY SCREEN IS REQUIRED FOR DRAWING TYPES IDENTIFIED IN 24590-WTP-GPP-SREG-002

'E' SIZE - 44x34
COMPUTER GENERATED - MANUAL CHANGES NOT PERMITTED

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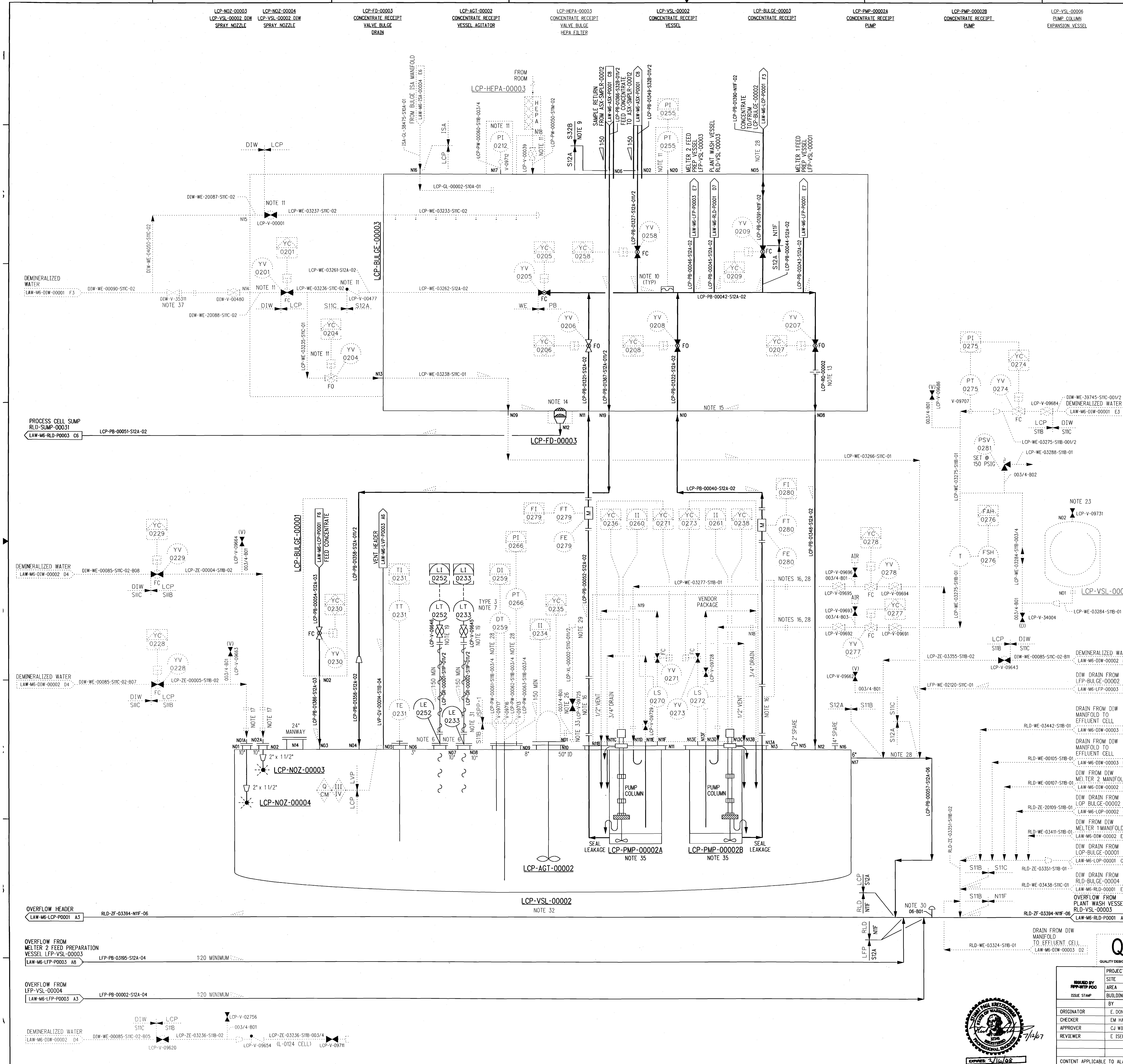

NOTES:

1. SEE DRAWINGS 24590-WTP-M6-50-P0001 THROUGH 24590-WTP-M6-50-P0008 FOR GENERAL NOTES, SYMBOLS AND LEGEND, AND GENERAL SLOPE REQUIREMENTS.
2. THE PRESSURE BOUNDARY FOR ALL SYSTEMS, STRUCTURES AND COMPONENTS SHOWN ON THIS DRAWING IS QUALITY LEVEL CM AND SEISMIC CATEGORY SC-IV UNLESS OTHERWISE INDICATED.
3. DELETED
4. DELETED
5. DELETED
6. RADAR GUIDE TUBE IS TO BE ROUTED TO THE FLOOR ABOVE.
7. PROVISION FOR FLUSHING USING DEMINERALIZED WATER IS REQUIRED.
8. DELETED
9. OUTER PIPE DRAINS INTO THE BULGE.
10. WHERE SLOPE IS DESIGNATED ON PIPING, SLOPE 1:200 MINIMUM UNLESS OTHERWISE NOTED.
11. ITEMS INSIDE THE BULGE AND INSIDE DASHED LINES EXTENDING OUTSIDE THE BULGE ARE PROVIDED BY VENDOR.
12. DELETED
13. WELDED RESTRICTION ORIFICE MACHINED FROM BAR STOCK.
14. STRAINER IS DESIGNED FOR MECHANICAL REMOVAL FROM THE BULGE EXTERIOR.
15. SLOPE BULGE FLOOR 1:100 TOWARDS THE DRAIN.
16. SPOOL PIECE TO FACILITATE PUMP REMOVAL.
17. SPOOL PIECE TO FACILITATE SPRAY NOZZLE REMOVAL.
18. CONTENTS OF THIS DOCUMENT ARE DANGEROUS WASTE PERMIT AFFECTING
19. FULL PORT VALVE REQUIRED ON THE RADAR GUIDE TUBES.
20. DELETED
21. DELETED
22. DELETED
23. AIR CHARGING VALVE PROVIDED WITH EXPANSION VESSEL BY VENDOR.
24. DELETED.
25. DELETED
26. LOCATE VALVE ABOVE EL. 28'-0". FULL PORT VALVE REQUIRED.
27. DELETED
28. DO NOT POCKET.
29. THIS CONNECTION ALLOWS MAINTENANCE ACCESS FROM 28'-0" FLOOR ELEVATION FOR AGITATOR OIL CHANGE. A CART-MOUNTED OIL SUCTION DEVICE WILL BE USED.
30. A 6" CLEAN OUT CONNECTION TO BE LOCATED IN ROOM L0125.
31. JPSS-1 IS DEFINED IN INSTRUMENT PIPING MATERIAL CLASS SPEC NO. 24590-WTP-3PS-JXF0-T0001.
32. THE SEISMIC RESTRAINT FOR LCP-VSL-00002 IS SEISMIC CATEGORY SC-III.
33. OIL COLLECTION LEG EXTENDS MIN 3 IN. BELOW OIL DRAIN/REFILL NOZZLE.
34. DELETED
35. THIS IS A CONCENTRATE RECEIPT PUMP SYMBOL.
36. DELETED
37. SPOOL CONNECTION FOR THE INJECTION OF PRESSURIZED WATER/CHEMICALS TO CLEAR LINE PLUG UPS. THE SPOOL LENGTH SHALL ACCOMMODATE THE LENGTH OF A TEE WITH FLANGES MATCHING THE PIPE SIZE.
38. THE COMPONENTS SHOWN ON THIS DRAWING IN PHANTOM DO NOT REQUIRE INDEPENDENT QUALIFIED REGISTERED PROFESSIONAL ENGINEER ASSESSMENTS OF DESIGN OR INSTALLATION INSPECTIONS BY A QUALIFIED INSTALLATION INSPECTOR IN ACCORDANCE WITH THE DWP AND/OR WASHINGTON ADMINISTRATIVE CODE REQUIREMENTS.
39. THE DOCUMENT WAS COMPLETELY REVISED AND IDENTIFICATION OF REVISED ITEM IS NOT NECESSARY. REVISED PER 24590-LAW-M6N-LCP-00007, 00009, 00013, 00015, 00017, 00018, 00021, 00022, 24590-LAW-M6PR-LCP-00001 AND 24590-LAW-M6N-M80T-00001. ADDED MAGNETIC FLOW METER TO LCP PUMP DISCHARGE LINES. ADDED SLOPE SYMBOLS, INSTRUMENT SERVICE AIR FROM ISA MANIFOLD TO BULGE. DELETED SEISMIC CATEGORY FLAGS, INCORPORATED VARIOUS EDITORIAL COMMENTS AND UPDATED INSTRUMENT SYMBOLS.

HOLD/OPEN ITEMS:

1-6. DELETED

REFERENCES:

1. THE REQUIRED BATCH SEQUENCES, PERMISSIVES, INTERLOCKS, ALARMS AND OPERATOR INTERFACE POINTS ARE FULLY DESCRIBED IN THE SOFTWARE FUNCTIONAL SPECIFICATION FOR LCP CONCENTRATE RECEIPT PROCESS SYSTEM, 24590-LAW-3PS-LCP-T0001.
2. 24590-LAW-M5-V17T-P0002, PROCESS FLOW DIAGRAM LAW CONCENTRATE RECEIPT AND MELTER 2 FEED (SYSTEM LCP, GFR, AND LFP).

PLEASE NOTE THAT SOURCE, SPECIAL NUCLEAR AND BYPRODUCT MATERIALS, AS DEFINED IN THE ATOMIC ENERGY ACT OF 1954 (AEA), ARE REGULATED AT THE U.S. DEPARTMENT OF ENERGY (DOE) FACILITIES EXCLUSIVELY BY DOE ACTING PURSUANT TO ITS AEA AUTHORITY. DOE ASSERTS, THAT PURSUANT TO THE AEA, IT HAS SOLE AND EXCLUSIVE RESPONSIBILITY AND AUTHORITY TO REGULATE SOURCE, SPECIAL NUCLEAR, AND BYPRODUCT MATERIAL AT DOE-OWNED NUCLEAR FACILITIES. INFORMATION CONTAINED HEREIN ON RADIONUCLIDES IS PROVIDED FOR PROCESS DESCRIPTION PURPOSES ONLY.

Q
QUALITY DESIGNATOR

REV	DESCRIPTION	ORG	CHKD	RVWD	APVD	DATE
2	ISSUED FOR PERMITTING USE	[signature]	[signature]	[signature]	[signature]	7/12/07
1	ISSUED FOR PERMITTING USE	MS	EH	EI	CJW	4/29/04
0	ISSUED FOR PERMITTING USE	ED	MD	EI	CJW	12/30/03

REVISION HISTORY

ISSUED BY RPP-WTP PDC
ISSUE STAMP

PROJECT No.	24590
SITE	HANFORD
AREA	200E
BUILDING No.	20

	BY	DATE
ORIGINATOR	E. DONOSO	12/23/03
CHECKER	EM HAN	12/23/03
APPROVER	CJ WINKLER	12/30/03
REVIEWER	E ISERN	12/23/03

CONTENT APPLICABLE TO ALARA? [X] YES [ ] NO
ADR NO. N/A REV: N/A
SAFETY SCREEN REQUIRED? [ ] YES [X] NO E&NS INITIAL IF YES ____

RIVER PROTECTION PROJECT
WASTE TREATMENT PLANT
2435 STEVENS CENTER PLACE
RICHLAND, WA 99354

CONTRACT No: DE-AC27-01RV14136

P & ID - LAW CONCENTRATE RECEIPT PROCESS SYSTEM CONCENTRATE RECEIPT VESSEL LCP-VSL-00002

SCALE: NONE
24590-LAW-M6-LCP-P0002
REV 2

7/12/07
EXPIRES 7/16/08

SAFETY SCREEN IS REQUIRED FOR DRAWING TYPES IDENTIFIED IN 24590-WTP-GPP-SREG-002

'E' SIZE - 44x34
COMPUTER GENERATED - MANUAL CHANGES NOT PERMITTED

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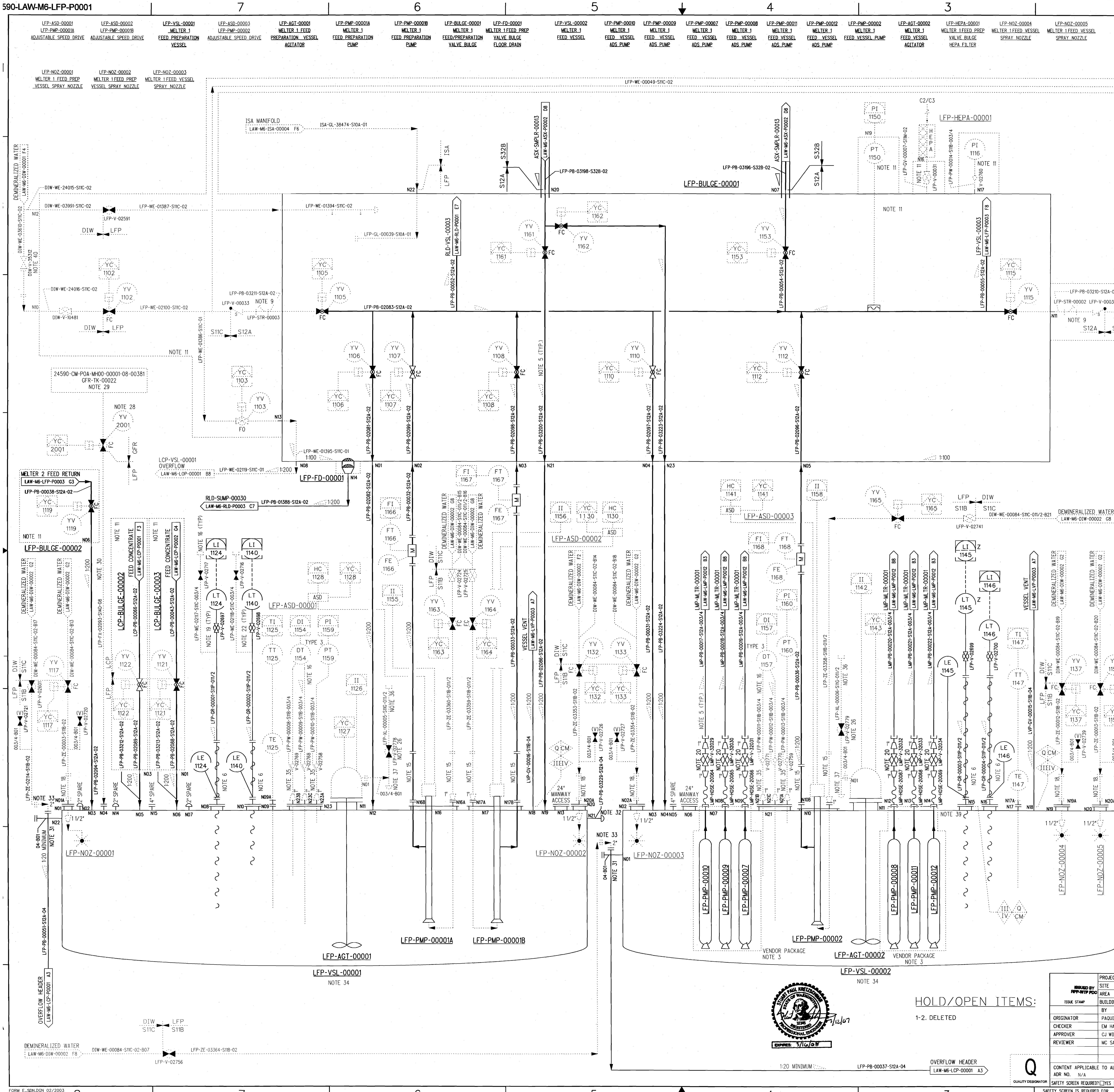

NOTES:

1. SEE DRAWINGS 24590-WTP-M6-50-00001 THROUGH 24590-WTP-M6-50-00008 FOR GENERAL NOTES, SYMBOLS AND LEGENDS, AND GENERAL SLOPE REQUIREMENTS.
2. THE PRESSURE BOUNDARY FOR ALL SYSTEMS, STRUCTURES, AND COMPONENTS SHOWN ON THIS DRAWING IS QUALITY LEVEL CM AND SEISMIC CATEGORY SC-IV, UNLESS OTHERWISE NOTED.
3. FOR ADS PUMP CONTROLS AND ADDITIONAL VESSEL INSTRUMENTATION, SEE DWG 24590-LAW-M6-LFP-00002.
4. DELETED
5. WHERE SLOPING IS DESIGNATED ON PIPING SLOPE 1:50 (MINIMUM) UNLESS OTHERWISE NOTED.
6. RADAR GUIDE TUBE IS TO BE ROUTED TO THE FLOOR ABOVE.

7-8. DELETED

9. POSITION STRAINER (WITHOUT STRAINER INTERNALS) WITH THE STRAINER PORT IN THE UP POSITION TO ALLOW FOR LINE CLEANING.
10. DELETED
11. ITEMS INSIDE THE BULGES AND INSIDE THE DASHED LINES EXTENDING OUTSIDE THE BULGE ARE PROVIDED BY VENDOR.

12-14. DELETED

15. REMOVABLE SPOOL TO FACILITATE PUMP REMOVAL.
16. PROVISION FOR FLUSHING USING DEMINERALIZED WATER IS REQUIRED (INSTRUMENTATION SCOPE).
17. CONTENTS OF THIS DOCUMENT ARE DANGEROUS WASTE PERMIT AFFECTING.
18. REMOVABLE SPOOL TO FACILITATE SPRAY NOZZLE REMOVAL.
19. FULL PORT VALVE IS REQUIRED ON THE RADAR GUIDE TUBES.
20. ADS PUMP MELTER FEED HOSE AND VALVE SUPPLIED BY VENDOR. HOSE END CONNECTIONS ARE HILTAP COUPLINGS.
21. DELETED
22. DRILL 3/8" DIAMETER HOLE IN THE 1 1/2" RADAR TUBE AT THE DEMINERALIZED WATER CONNECTION.

23-25. DELETED

26. LOCATE VALVE ABOVE ELEVATION 28'-0". FULL PORT VALVE REQUIRED.
27. DELETED
28. FULL PORT BALL VALVE IS REQUIRED FOR GLASS FORMERS.
29. VENDOR SUPPLIED EQUIPMENT IS SKID MOUNTED UNIT.
30. MINIMUM ANGLE OF PIPE IS 60 DEGREES FROM HORIZONTAL.
31. FOR VESSEL LFP-VSL-00001, MAXIMUM HORIZONTAL DISTANCE BETWEEN DOWNCOMER PIPE AND VESSEL SHELL SHALL BE NO MORE THAN FIVE PIPE DIAMETERS. FOR VESSEL LFP-VSL-00002, HORIZONTAL DISTANCE BETWEEN DOWNCOMER PIPE AND VESSEL SHELL SHALL BE AS SHORT AS POSSIBLE, NOT EXCEEDING SIX PIPE DIAMETERS. CONNECT DEMINERALIZED WATER LINE AT THE TOP FLANGE CONNECTION OF THE CROSS FITTING. STRAIGHT VERTICAL DOWNCOMER RUN SHALL BE A MINIMUM OF SIX FEET. SLOPE IS NOT REQUIRED AT VESSEL NOZZLE CONNECTION.
32. CAP NOZZLE 21. CONSTRUCTION TO FURNISH AND INSTALL A PIPE CAP IN ACCORDANCE WITH PIPE CLASS S12A.
33. A CROSS PIPE FITTING WILL BE USED. REMOVABLE PIECE IS TO FACILITATE INSPECTION OF OVERFLOW DOWNCOMER.
34. SEISMIC RESTRAINT FOR LFP VESSELS IS SEISMIC CATEGORY SC-III.
35. DO NOT POCKET.
36. THIS CONNECTION ALLOWS MAINTENANCE ACCESS FROM 28 FT FLOOR ELEVATION FOR AGITATOR OIL CHANGE. A CART-MOUNTED OIL SUCTION DEVICE WILL BE USED.
37. OIL COLLECTION LEG EXTENDS MIN 3 IN BELOW DRAIN/REFILL NOZZLE.
38. DELETED
39. RADAR CONE IS QUALITY LEVEL Q AND SEISMIC CATEGORY SC-III.
40. SPOOL CONNECTION FOR THE INJECTION OF PRESSURIZED WATER/CHEMICALS TO CLEAR LINE PLUG UPS. THE SPOOL LENGTH SHALL ACCOMMODATE THE LENGTH OF A TEE WITH FLANGES MATCHING THE PIPE SIZE.
41. THE COMPONENTS SHOWN ON THIS DRAWING IN PHANTOM DO NOT REQUIRE INDEPENDENT QUALIFIED REGISTERED PROFESSIONAL ENGINEER ASSESSMENTS OF DESIGN OR INSTALLATION INSPECTIONS BY A QUALIFIED INSTALLATION INSPECTOR IN ACCORDANCE WITH THE DWP AND/OR WASHINGTON ADMINISTRATIVE CODE REQUIREMENTS.
42. THE DOCUMENT WAS COMPLETELY REVISED AND IDENTIFICATION OF REVISED ITEM IS NOT NECESSARY. REVISED PER 24590-LAW-M6N-LFP-00001, 00005, 00009, 00014, 00017, 00023, 00025, 00026, 00027 AND 24590-LAW-M6N-M80T-00001. ADDED MAGNETIC FLOW METER TO LFP PUMP DISCHARGE LINES. ADDED SLOPE SYMBOLS, DELETED SEISMIC CATEGORY FLAGS, UPDATED INSTRUMENT SYMBOLS AND INCORPORATED VARIOUS EDITORIAL COMMENTS.

REFERENCES:

1. THE REQUIRED BATCH SEQUENCES, PERMISSIVES, INTERLOCKS, ALARMS AND OPERATOR INTERFACE POINTS ARE FULLY DESCRIBED IN THE SOFTWARE FUNCTIONAL SPECIFICATION, FOR LAW MELTER FEED PROCESS (LFP) SYSTEM, 24590-LAW-3PS-LFP-T0001.
2. 24590-LAW-M5-V17T-P0001, PROCESS FLOW DIAGRAM LAW CONCENTRATE RECEIPT AND MELTER 1 FEED (SYSTEM LCP, GFR, AND LFP).

PLEASE NOTE THAT SOURCE, SPECIAL NUCLEAR AND BYPRODUCT MATERIALS, AS DEFINED IN THE ATOMIC ENERGY ACT OF 1954 (AEA), ARE REGULATED AT THE U.S. DEPARTMENT OF ENERGY (DOE) FACILITIES EXCLUSIVELY BY DOE ACTING PURSUANT TO ITS AEA AUTHORITY. DOE ASSERTS, THAT PURSUANT TO THE AEA, IT HAS SOLE AND EXCLUSIVE RESPONSIBILITY AND AUTHORITY TO REGULATE SOURCE, SPECIAL NUCLEAR, AND BYPRODUCT MATERIAL AT DOE-OWNED NUCLEAR FACILITIES. INFORMATION CONTAINED HEREIN ON RADIONUCLIDES IS PROVIDED FOR PROCESS DESCRIPTION PURPOSES ONLY.

HOLD/OPEN ITEMS:

1-2. DELETED

REV	DESCRIPTION	ORG	CHKD	RVWD	APVD	DATE
2	ISSUED FOR PERMITTING USE	[signature]	[signature]	[signature]	[signature]	7/12/07
1	ISSUED FOR PERMITTING USE	PSH	EH	MS	CJW	5/6/04
0	ISSUED FOR PERMITTING USE	PSH	EH	MS	CJW	12/30/03

REVISION HISTORY

ISSUED BY RPP-WTP PDC
ISSUE STAMP

PROJECT No.	24590
SITE	HANFORD
AREA	200E
BUILDING No.	20

	BY	DATE
ORIGINATOR	PAQUITO S. HOLGADO	10/28/03
CHECKER	EM HAN	10/28/03
APPROVER	CJ WINKLER	12/30/03
REVIEWER	MC SANVICTORES	12/28/03

CONTENT APPLICABLE TO ALARA? [X] YES [ ] NO
ADR NO. N/A REV: N/A
SAFETY SCREEN REQUIRED? [ ] YES [X] NO E&NS INITIAL IF YES ____

Q
QUALITY DESIGNATOR

BECHTEL
RIVER PROTECTION PROJECT
WASTE TREATMENT PLANT
2435 STEVENS CENTER PLACE
RICHLAND, WA 99354

CONTRACT No: DE-AC27-01RV14136

P&ID-LAW
MELTER FEED PROCESS SYSTEM
MELTER 1 FEED PREPARATION AND FEED

SCALE: NONE
24590-LAW-M6-LFP-P0001
REV 2

SAFETY SCREEN IS REQUIRED FOR DRAWING TYPES IDENTIFIED IN 24590-WTP-GPP-SREG-002

'E' SIZE - 44x34
COMPUTER GENERATED - MANUAL CHANGES NOT PERMITTED

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PLOTTED BY: eewebb
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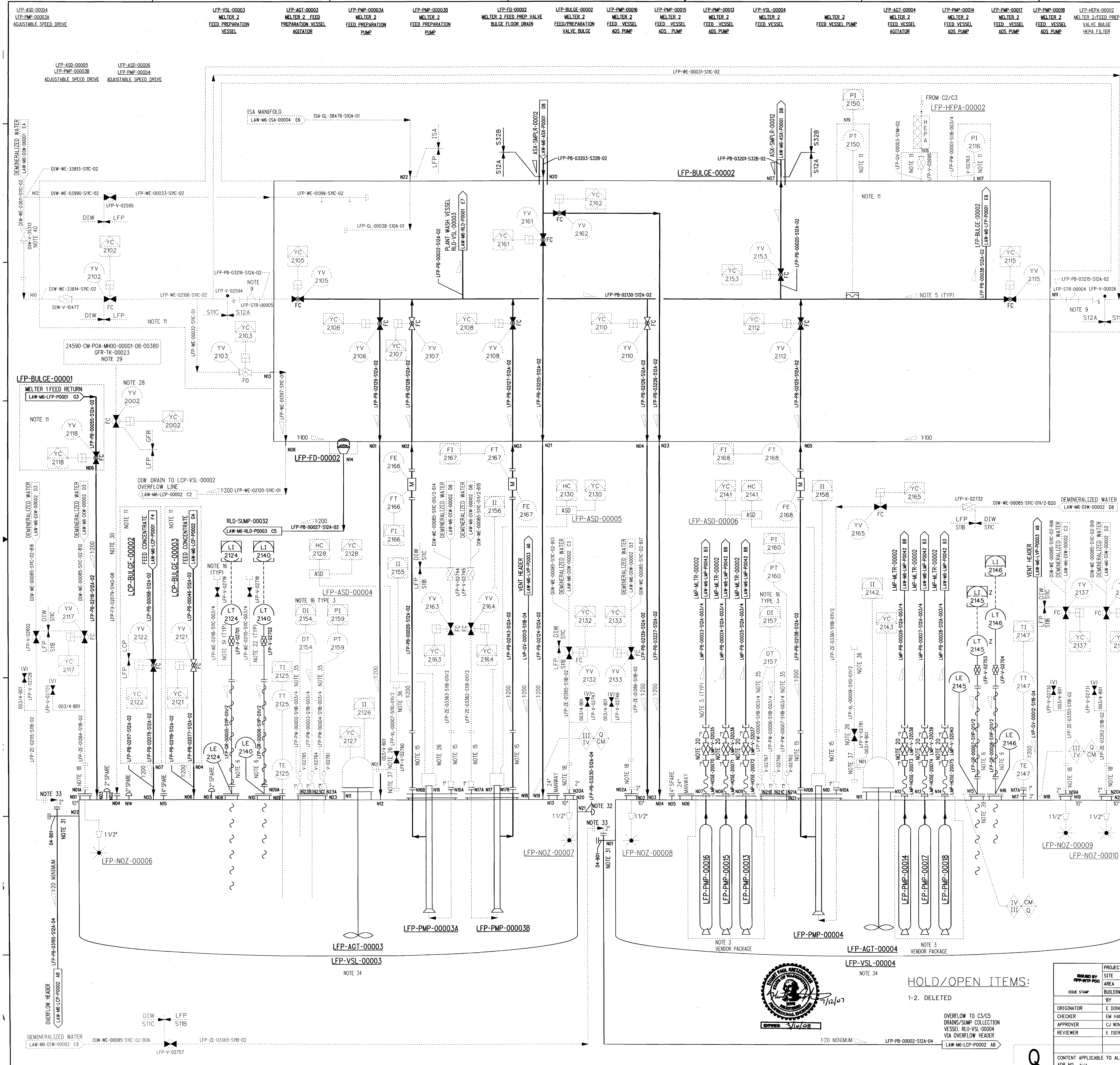
FORM E_SDN.DGN 02/2003



HOLD/OPEN ITEMS:

1-2. DELETED

NOTES:

1. SEE DRAWINGS 24590-WTP-M6-50-00001 THROUGH 24590-WTP-M6-50-00008 FOR GENERAL NOTES, SYMBOLS AND LEGEND, AND GENERAL SLOPE REQUIREMENTS.
2. THE PRESSURE BOUNDARY FOR ALL SYSTEMS, STRUCTURES, AND COMPONENTS SHOWN ON THIS DRAWING IS QUALITY LEVEL CM AND SEISMIC CATEGORY SC-IV UNLESS OTHERWISE NOTED.
3. FOR ADS PUMP CONTROLS AND ADDITIONAL VESSEL INSTRUMENTATION, SEE DWG 24590-LAW-M6-LFP-00004.
4. DELETED
5. WHERE SLOPING IS DESIGNATED ON PIPING, SLOPE 1:50 (MINIMUM) UNLESS OTHERWISE NOTED.
6. RADAR GUIDE TUBE IS TO BE ROUTED TO THE FLOOR ABOVE.
7. DELETED
8. DELETED
9. POSITION STRAINER (WITHOUT STRAINER INTERNALS) WITH THE STRAINER PORT IN THE UP POSITION TO ALLOW FOR LINE CLEANING.
10. DELETED
11. ITEMS INSIDE THE BULGE AND INSIDE THE DASHED LINES EXTENDING OUTSIDE THE BULGE ARE PROVIDED BY VENDOR.

12-14. DELETED

15. REMOVABLE SPOOL TO FACILITATE PUMP REMOVAL.
16. PROVISION FOR FLUSHING USING DEMINERALIZED WATER IS REQUIRED (INSTRUMENTATION SCOPE).
17. CONTENTS OF THIS DOCUMENT ARE DANGEROUS WASTE PERMIT AFFECTING.
18. REMOVABLE SPOOL TO FACILITATE SPRAY NOZZLE REMOVAL.
19. FULL PORT VALVE IS REQUIRED ON THE RADAR GUIDE TUBES.
20. ADS PUMP MELTER FEED HOSE AND VALVE SUPPLIED BY VENDOR HOSE END CONNECTIONS ARE HILTAP COUPLINGS.
21. DELETED
22. DRILL 3/8" DIAMETER HOLE IN THE 1 1/2" RADAR TUBE AT THE DEMINERALIZED WATER CONNECTION.

23-25. DELETED

26. LOCATE VALVE ABOVE ELEVATION 28'-0". FULL PORT VALVE REQUIRED.
27. DELETED
28. FULL PORT BALL VALVE IS REQUIRED FOR GLASS FORMERS.
29. VENDOR SUPPLIED EQUIPMENT.
30. MINIMUM ANGLE OF PIPE IS 60 DEGREES FROM HORIZONTAL.
31. FOR VESSEL LFP-VSL-00003, MAXIMUM HORIZONTAL DISTANCE BETWEEN DOWNCOMER PIPE AND VESSEL SHELL SHALL BE NO MORE THAN FIVE PIPE DIAMETERS. FOR VESSEL LFP-VSL-00004, HORIZONTAL DISTANCE BETWEEN DOWNCOMER PIPE AND VESSEL SHELL SHALL BE AS SHORT AS POSSIBLE, NOT EXCEEDING SIX PIPE DIAMETERS. CONNECT DEMINERALIZED WATER LINE AT THE TOP FLANGE CONNECTION OF THE CROSS FITTING. STRAIGHT VERTICAL DOWNCOMER RUN SHALL BE A MINIMUM OF SIX FEET. SLOPE IS NOT REQUIRED AT VESSEL NOZZLE CONNECTION.
32. CAP NOZZLE 21. CONSTRUCTION TO FURNISH AND INSTALL A PIPE CAP IN ACCORDANCE WITH PIPE CLASS S12A.
33. A CROSS PIPE FITTING WILL BE USED. REMOVABLE PIECE IS TO FACILITATE INSPECTION OF OVERFLOW DOWNCOMER.
34. SEISMIC RESTRAINT FOR LFP VESSELS IS SEISMIC CATEGORY SC-III.
35. DO NOT POCKET.
36. THIS CONNECTION ALLOWS MAINTENANCE ACCESS FROM 28 FT FLOOR ELEVATION FOR AGITATOR OIL CHANGE. A CART-MOUNTED OIL SUCTION DEVICE WILL BE USED.
37. OIL COLLECTION LEG EXTENDS MIN 3 IN BELOW DRAIN/REFILL NOZZLE.
38. DELETED
39. RADAR CONE IS QUALITY LEVEL Q AND SEISMIC CATEGORY SC-III.
40. SPOOL CONNECTION FOR THE INJECTION OF PRESSURIZED WATER/CHEMICALS TO CLEAR LINE PLUG UPS. THE SPOOL LENGTH SHALL ACCOMMODATE THE LENGTH OF A TEE WITH FLANGES MATCHING THE PIPE SIZE.
41. THE COMPONENTS SHOWN ON THIS DRAWING IN PHANTOM DO NOT REQUIRE INDEPENDENT QUALIFIED REGISTERED PROFESSIONAL ENGINEER ASSESSMENTS OF DESIGN OR INSTALLATION INSPECTIONS BY A QUALIFIED INSTALLATION INSPECTOR IN ACCORDANCE WITH THE DWP AND/OR WASHINGTON ADMINISTRATIVE CODE REQUIREMENTS.
42. THE DOCUMENT WAS COMPLETELY REVISED AND IDENTIFICATION OF REVISED ITEM IS NOT NECESSARY. REVISED PER 24590-LAW-M6N-LFP-00002, 00006, 00010, 00014, 00017, 00023, 00025, 00026, 00027 AND 24590-LAW-M6N-M80T-00001. ADDED MAGNETIC FLOW METER TO LFP PUMP DISCHARGE LINES. ADDED SLOPE SYMBOLS, REMOVE EQUIPMENT DESCRIPTION FOR BULGES THAT ARE REFERENCED ONLY [H-8]. UPDATED INSTRUMENT SYMBOLS AND INCORPORATED VARIOUS EDITORIAL COMMENTS.

REFERENCES:

1. THE REQUIRED BATCH SEQUENCES, PERMISSIVES, INTERLOCKS, ALARMS AND OPERATOR INTERFACE POINTS ARE FULLY DESCRIBED IN THE SOFTWARE FUNCTIONAL SPECIFICATION, FOR LAW MELTER FEED PROCESS (LFP) SYSTEM, 24590-LAW-3PS-LFP-T0001.
2. 24590-LAW-M5-V17T-P0002, PROCESS FLOW DIAGRAM LAW CONCENTRATE RECEIPT AND MELTER 2 FEED (SYSTEM LCP, GFR, AND LFP).

REV	DESCRIPTION	ORG	CHKD	RVWD	APVD	DATE
2	ISSUED FOR PERMITTING USE	[signature]	[signature]	[signature]	[signature]	7/12/07
1	ISSUED FOR PERMITTING USE	MS	EH	EI	CJW	5/6/04
0	ISSUED FOR PERMITTING USE	ED	EH	EI	CJW	12/30/03

REVISION HISTORY

ISSUED BY RPP-WTP PDC
ISSUE STAMP

PROJECT No.	24590
SITE	HANFORD
AREA	200E
BUILDING No.	20

RIVER PROTECTION PROJECT
WASTE TREATMENT PLANT
2435 STEVENS CENTER PLACE
RICHLAND, WA 99354

CONTRACT No: DE-AC27-01RV14136

	BY	DATE
ORIGINATOR	E DONOSO	12/29/03
CHECKER	EM HAN	12/29/03
APPROVER	CJ WINKLER	12/30/03
REVIEWER	E ISERN	12/30/03

P&ID-LAW MELTER FEED PROCESS SYSTEM MELTER 2 FEED PREPARATION AND FEED

Q
QUALITY DESIGNATOR

CONTENT APPLICABLE TO ALARA? [X] YES [ ] NO
ADR NO. N/A REV: N/A
SAFETY SCREEN REQUIRED? [ ] YES [X] NO E&NS INITIAL IF YES

SCALE: NONE
24590-LAW-M6-LFP-P0003
REV 2

SAFETY SCREEN IS REQUIRED FOR DRAWING TYPES IDENTIFIED IN 24590-WTP-GPP-SREG-002

'E' SIZE - 44x34
COMPUTER GENERATED - MANUAL CHANGES NOT PERMITTED

R10803913
07/05/2007 08:18:21 AM

FORM E_SDN.DGN 02/2003

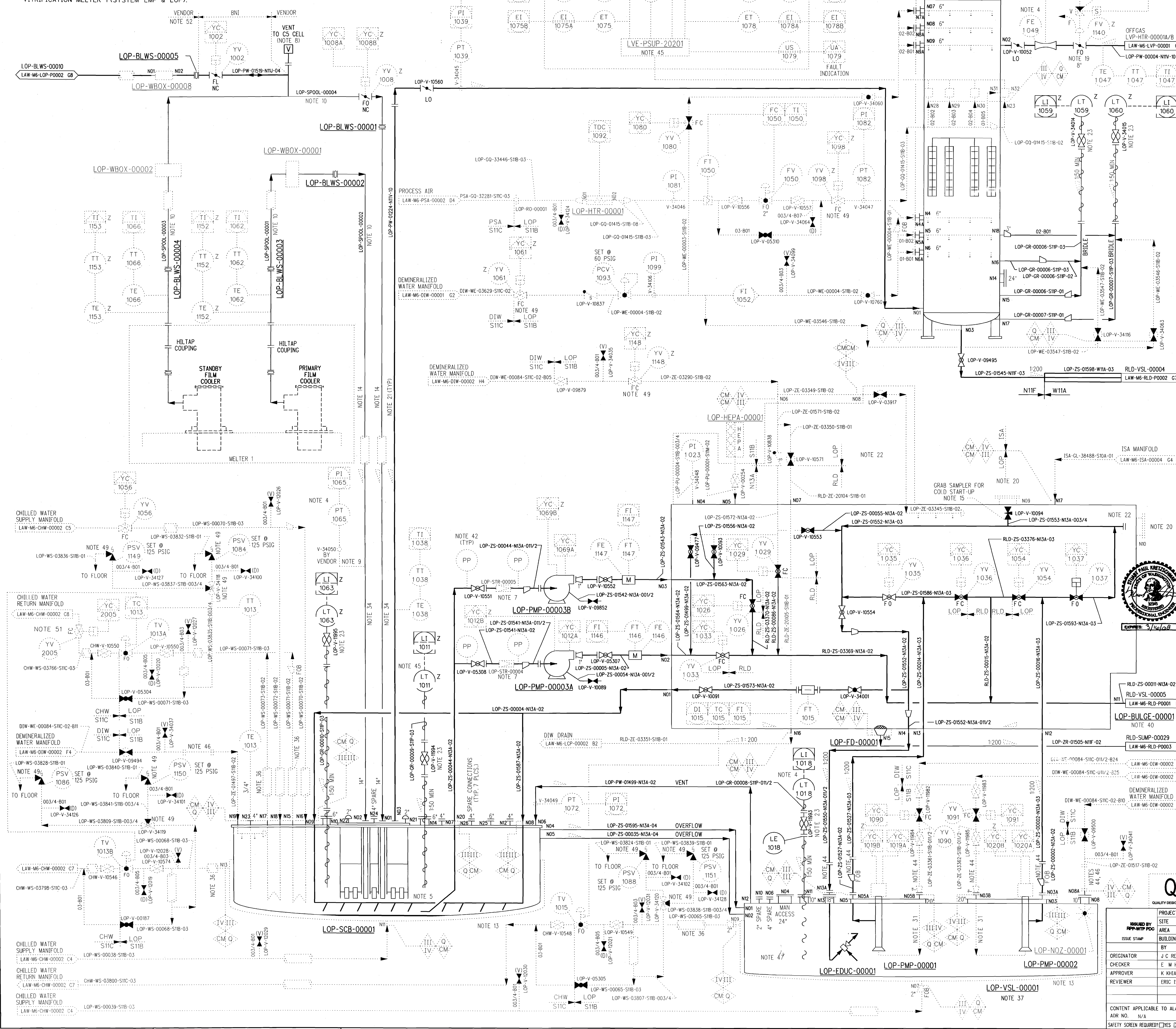
PLOTTED BY: eewebb
C:\Work\dms05069\LAWM6LFPP0003.dgn

REFERENCES:

1. FOR PERMISSIVES AND INTERLOCKS TO IMPORTANT TO SAFETY (ITS) SYSTEMS REFER TO 24590-LAW-3PS-PPJ-T0002, -T0003.
2. THE REQUIRED BATCH SEQUENCES, PERMISSIVES, INTERLOCKS, ALARMS AND OPERATOR INTERFACE POINTS ARE FULLY DESCRIBED IN THE SOFTWARE FUNCTIONAL SPECIFICATION, FOR LOP-LAW PRIMARY OFFGAS PROCESS SYSTEM, 24590-LAW-3PS-LOP-T0001.
3. 24590-LAW-M5-V17T-P0004, PROCESS FLOW DIAGRAM LAW VITRIFICATION MELTER 1 (SYSTEM LMP & LOP).

HOLD/OPEN ITEMS:

1-7. DELETED.



NOTES:

1. SEE DRAWINGS 24590-WTP-M6-50-P0001 THROUGH 24590-WTP-M6-50-P0008 FOR GENERAL NOTES, SYMBOLS AND LEGEND, AND GENERAL SLOPE REQUIREMENTS.

2-3. DELETED

4. INSTRUMENTS ARE QUALITY LEVEL CM UNLESS DESIGNATED BY A "Z" OR ARE AIR PERMIT AFFECTING. INSTRUMENT ROOT VALVE AND TUBING QUALITY LEVEL ARE THE SAME AS THE CONNECTING PROCESS PIPE UNLESS NOTED OTHERWISE.
5. DISTRIBUTION HEADER INSIDE SUBMERGED BED SCRUBBER IS PROVIDED BY VESSEL VENDOR.
6. DELETED
7. PROVIDE REMOVABLE PIPING SPOOL FOR STARTUP STRAINER. STRAINER WILL BE REMOVED PRIOR TO STARTUP.
8. SPECIAL RELIEF DEVICE VENTS AT + 10 INCHES W.G.
9. LOCATE TAP FOR PT-1065 AS CLOSE TO LOP-SCB-00001 AS POSSIBLE. PT-1065 HAS AN INSTRUMENT AIR PURGE (NOT SHOWN).
10. SPECIALLY ENGINEERED PIPING SPOOL WITH HILTAP COUPLING.

11-12. DELETED

13. HALF PIPE JACKET.
14. INSULATION BY VENDOR.
15. TO BE SEALED AFTER COLD STARTUP.

16-18. DELETED

19. BUTTERFLY VALVE TO BE SUPPLIED WITH A MANUAL STOP TO PREVENT VALVE FV-1140 FROM CLOSING MORE THAN 70% FROM THE OPEN POSITION (TO MAINTAIN CONTINUITY OF FLOW).
20. ACCESS PANEL ON EXTERIOR OF BULGE.
21. WHERE SLOPING IS DESIGNATED ON PIPING, SLOPE 1:50 MIN. FROM HIGH POINT UNLESS OTHERWISE NOTED.
22. ITEMS INSIDE THE BULGE AND INSIDE DASHED LINES EXTENDING OUTSIDE THE BULGE ARE PROVIDED BY VENDOR.
23. RADAR GUIDE TUBE TO BE ROUTED TO TRANSMITTER LOCATED ON THE FLOOR ABOVE. A FULL PORT BALL VALVE IS REQUIRED FOR ISOLATION PURPOSES AT TRANSMITTER END OF GUIDE TUBE.

24-28. DELETED

29. CONTENTS OF THIS DOCUMENT ARE DANGEROUS WASTE PERMIT AFFECTING.
30. DELETED
31. VESSEL INTERNAL PUMP PRIMING AND DISCHARGE PIPING SUPPLIED WITH PUMP BY VENDOR.
32. PDI-1039 IS A CALCULATED VALUE DERIVED FROM WESP INLET PRESSURE PI-1039 AND WESP OUTLET PRESSURE PI-1049.
33. DELETED
34. SEE DRAWING 24590-LAW-M61-P23T-00002 AND 00005 FOR DOWNCOMER DETAILS.
35. DELETED
36. CHILLED WATER RETURN LINES WILL HAVE ANTI-SWEAT INSULATION (AS) IN THE CELL AND COLD SERVICE INSULATION (CC) OUTSIDE THE CELL.
37. SPARE NOZZLES N14, N15, N16 AND N17 ON LOP-VSL-00001 ARE NOT SHOWN ON THIS DRAWING FOR CLARITY.

38-39. DELETED

40. SLOPE PIPING INSIDE BULGE TOWARDS THE OUTLET.
41. DELETED
42. PETES PLUGS WILL BE REPLACED WITH REGULAR PLUGS AFTER START-UP.
43. DELETED
44. REMOVABLE PIPING SPOOL TO FACILITATE PUMP, MIXING EDUCTOR OR SPRAY NOZZLE REMOVAL.
45. PERFORMS AN AIR PERMIT FUNCTION.
46. NOT TO BE INSTALLED WHEN MELTERS ARE PROCESSING WASTE.
47. EQUIPMENT COMPONENTS INSIDE LOP-VSL-00001 ARE QUALITY LEVEL CM AND SEISMIC CATEGORY SC-III, HOWEVER THEIR OFFGAS CONFINEMENT BOUNDARY IS QUALITY LEVEL Q AND SEISMIC CATEGORY SC-III.
48. QUALITY LEVEL Q TO ASSURE OPEN PATH TO PSV.
49. VALVE MEETS QUALITY LEVEL Q AND SEISMIC CATEGORY SC III REQUIREMENTS.
50. DELETED
51. VALVE IS APC.
52. FOR VENDOR COMPONENT DETAILS SEE 24590-LAW-M61-P23T-00001, -00030.
53. THE COMPONENTS SHOWN ON THIS DRAWING IN PHANTOM DO NOT REQUIRE INDEPENDENT QUALIFIED REGISTERED PROFESSIONAL ENGINEER ASSESSMENTS OF DESIGN OR INSTALLATION INSPECTIONS BY A QUALIFIED INSTALLATION INSPECTOR IN ACCORDANCE WITH THE DWP AND/OR WASHINGTON ADMINISTRATIVE CODE REQUIREMENTS.
54. THE DOCUMENT WAS COMPLETELY REVISED AND IDENTIFICATION OF REVISED ITEM IS NOT NECESSARY. REVISED PER 24590-LAW-M6N-LOP-00008, 00015, 00016, 00018, 00025, 00026, 00028, 00033, 00034, 00035, 00037, 00038, 00040, 24590-LAW-M6PR-LOP-00003, 00009, 24590-LAW-M6PN-LOP-00003, 00004, 00006, 24590-LAW-M6N-M80T-00001, 24590-WTP-SDDR-PROC-05-00536 AND 24590-WTP-SDDR-M-06-00291. ADDED MAGNETIC FLOW METER TO LOP PUMP DISCHARGE LINES. ADDED NOZZLES SIZES, INSTRUMENT SERVICE AIR FROM ISA MANIFOLD TO BULGE. UPDATED INSTRUMENT SYMBOLS AND INCORPORATED VARIOUS EDITORIAL COMMENTS.

PLEASE NOTE THAT SOURCE, SPECIAL NUCLEAR AND BYPRODUCT MATERIALS, AS DEFINED IN THE ATOMIC ENERGY ACT OF 1954 (AEA), ARE REGULATED AT THE U.S. DEPARTMENT OF ENERGY (DOE) FACILITIES EXCLUSIVELY BY DOE ACTING PURSUANT TO ITS AEA AUTHORITY. DOE ASSERTS, THAT PURSUANT TO THE AEA, IT HAS SOLE AND EXCLUSIVE RESPONSIBILITY AND AUTHORITY TO REGULATE SOURCE, SPECIAL NUCLEAR, AND BYPRODUCT MATERIAL AT DOE-OWNED NUCLEAR FACILITIES. INFORMATION CONTAINED HEREIN ON RADIONUCLIDES IS PROVIDED FOR PROCESS DESCRIPTION PURPOSES ONLY.

EXPIRES: 3/16/08

7/12/07

Q
QUALITY DESIGNATOR

REVISION HISTORY

REV	DESCRIPTION	ORG	CHKD	RVWD	APVD	DATE
2	ISSUED FOR PERMITTING USE	LCS	WW	EI	KK	7/12/07
1	ISSUED FOR PERMITTING USE	MS	EH	EI	KK	5/17/04
0	ISSUED FOR PERMITTING USE	JCR	EH	EI	KK	1/28/04

ISSUED BY RPP-WTP PDC
ISSUE STAMP

PROJECT No.	24590
SITE	HANFORD
AREA	200E
BUILDING No.	20

	BY	DATE
ORIGINATOR	J C REWARI	1/26/04
CHECKER	E M HAN	1/26/04
APPROVER	K KHIANEY	1/28/04
REVIEWER	ERIC ISERN	1/26/04

CONTENT APPLICABLE TO ALARA? [X] YES [ ] NO
ADR NO. N/A REV: N/A
SAFETY SCREEN REQUIRED? [ ] YES [X] NO E&NS INITIAL IF YES ____

BECHTEL
RIVER PROTECTION PROJECT
WASTE TREATMENT PLANT
2435 STEVENS CENTER PLACE
RICHLAND, WA 99354

CONTRACT No: DE-AC27-01RV14136

P&ID-LAW PRIMARY OFFGAS PROCESS SYSTEM MELTER 1

SCALE: NTS
24590-LAW-M6-LOP-P0001
REV 2

SAFETY SCREEN IS REQUIRED FOR DRAWING TYPES IDENTIFIED IN 24590-WTP-GPP-SREG-002
'E' SIZE - 44x34
COMPUTER GENERATED - MANUAL CHANGES NOT PERMITTED

R10803914
07/05/2007 08:08:04 AM
PLOTTED BY: eewebb
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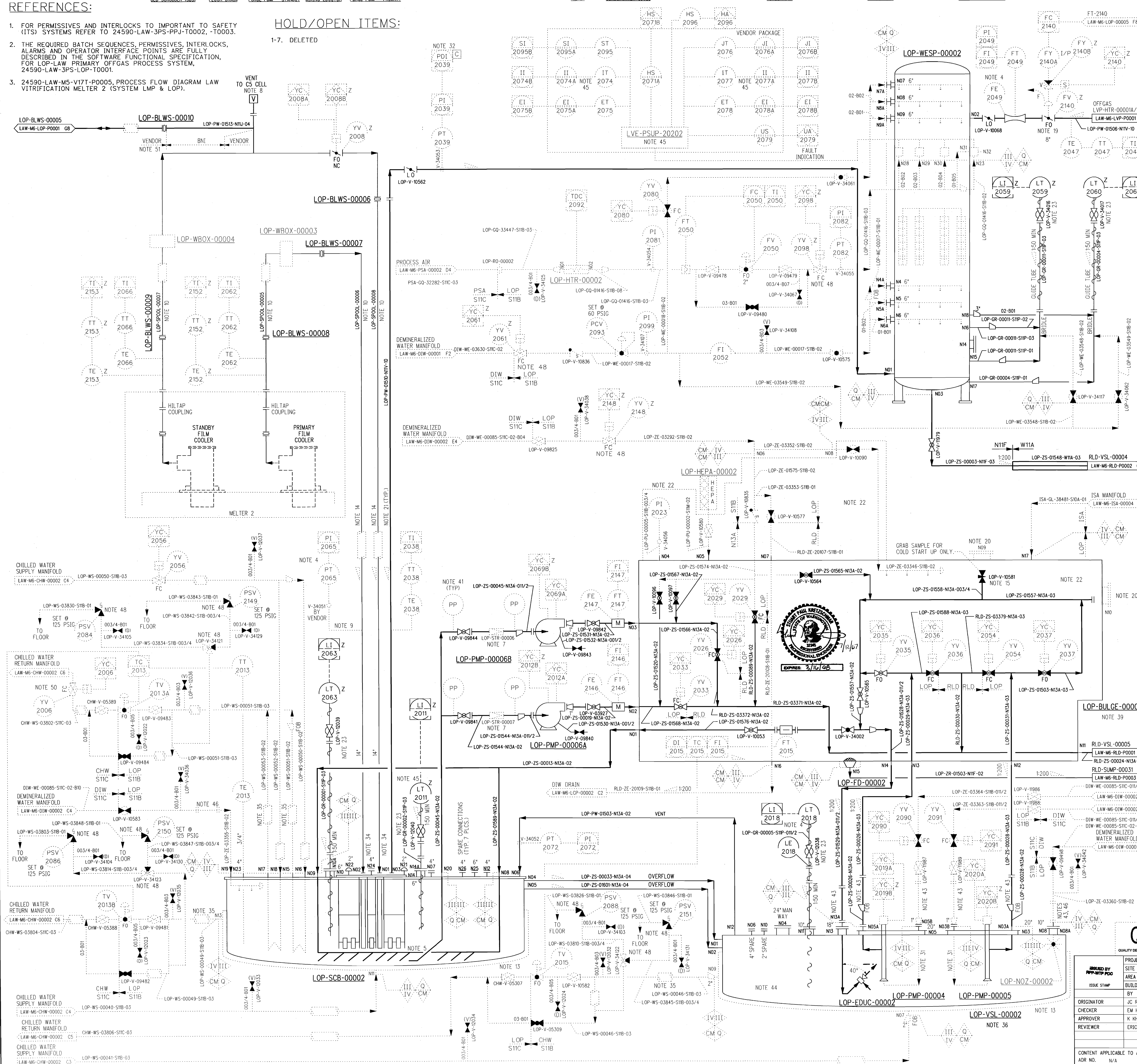
REFERENCES:

1. FOR PERMISSIVES AND INTERLOCKS TO IMPORTANT TO SAFETY (ITS) SYSTEMS REFER TO 24590-LAW-3PS-PPJ-T0002, -T0003.
2. THE REQUIRED BATCH SEQUENCES, PERMISSIVES, INTERLOCKS, ALARMS AND OPERATOR INTERFACE POINTS ARE FULLY DESCRIBED IN THE SOFTWARE FUNCTIONAL SPECIFICATION, FOR LOP-LAW PRIMARY OFFGAS PROCESS SYSTEM, 24590-LAW-3PS-LOP-T0001.
3. 24590-LAW-M5-V17T-P0005, PROCESS FLOW DIAGRAM LAW VITRIFICATION MELTER 2 (SYSTEM LMP & LOP).

HOLD/OPEN ITEMS:

1-7. DELETED



NOTES:

1. SEE DRAWINGS 24590-WTP-M6-50-P0001 THROUGH 24590-WTP-M6-50-P0008 FOR GENERAL NOTES, SYMBOLS AND LEGEND, AND GENERAL SLOPE REQUIREMENTS.

2-3. DELETED

4. INSTRUMENTS ARE QUALITY LEVEL CM UNLESS DESIGNATED BY A "Z" OR ARE AIR PERMIT AFFECTING. INSTRUMENT, ROOT VALVE, AND TUBING QUALITY LEVELS ARE THE SAME AS THE CONNECTING PROCESS PIPE UNLESS NOTED OTHERWISE.
5. DISTRIBUTION HEADER INSIDE SUBMERGED BED SCRUBBER IS PROVIDED BY VESSEL VENDOR.
6. DELETED
7. PROVIDE REMOVABLE PIPING SPOOL FOR STARTUP STRAINER. STRAINER WILL BE REMOVED PRIOR TO STARTUP.
8. SPECIAL RELIEF DEVICE VENTS AT + 10 INCHES W.G.
9. LOCATE TAP FOR PT-2065 AS CLOSE TO LOP-SCB-00002 AS POSSIBLE. PT-2065 HAS AN INSTRUMENT AIR PURGE (NOT SHOWN).
10. SPECIALLY ENGINEERED PIPING SPOOL WITH HILTAP COUPLING.

11-12. DELETED

13. HALF PIPE JACKET.
14. INSULATION BY VENDOR.
15. TO BE SEALED AFTER COLD STARTUP.

16-18. DELETED

19. BUTTERFLY VALVE TO BE SUPPLIED WITH A MANUAL STOP TO PREVENT VALVE FV-2140 FROM CLOSING MORE THAN 70% FROM THE OPEN POSITION (TO MAINTAIN CONTINUITY OF FLOW).
20. ACCESS PANEL ON EXTERIOR OF BULGE.
21. WHERE SLOPING IS DESIGNATED ON PIPING, SLOPE 1:50 MIN. FROM HIGH POINT, UNLESS OTHERWISE NOTED.
22. ITEMS INSIDE THE BULGE AND INSIDE DASHED LINES EXTENDING OUTSIDE THE BULGE ARE PROVIDED BY VENDOR.
23. RADAR GUIDE TUBE TO BE ROUTED TO TRANSMITTER LOCATED ON THE FLOOR ABOVE. A FULL PORT BALL VALVE IS REQUIRED FOR ISOLATION PURPOSES AT TRANSMITTER END OF GUIDE TUBE.

24-28. DELETED

29. CONTENTS OF THIS DOCUMENT ARE DANGEROUS WASTE PERMIT AFFECTING.
30. DELETED
31. VESSEL INTERNAL PUMP PRIMING AND DISCHARGE PIPING SUPPLIED WITH PUMP BY VENDOR.
32. PDI-2039 IS A CALCULATED VALUE DERIVED FROM WESP INLET PRESSURE PI-2039 AND WESP OUTLET PRESSURE PI-2049.
33. DELETED
34. SEE DRAWING 24590-LAW-M61-P23T-00031 AND 00034 FOR DOWNCOMER DETAILS.
35. CHILLED WATER RETURN LINES WILL HAVE ANTI-SWEAT INSULATION (AS) IN THE CELL AND COLD SERVICE INSULATION (CC) OUTSIDE THE CELL.
36. SPARE NOZZLES N14, N15, N16 AND N17 ON LOP-VSL-00002 ARE NOT SHOWN ON THIS DRAWING FOR CLARITY.

37-38. DELETED

39. SLOPE PIPING INSIDE BULGE TOWARD THE OUTLET.
40. DELETED
41. PETES PLUGS WILL BE REPLACED WITH REGULAR PLUGS AFTER START-UP.
42. DELETED
43. REMOVABLE PIPE SPOOL TO FACILITATE PUMP, MIXING EDUCTOR OR SPRAY NOZZLE REMOVAL.
44. EQUIPMENT COMPONENTS INSIDE LOP-VSL-00002 ARE QUALITY LEVEL CM AND SEISMIC CATEGORY SC-III, HOWEVER THEIR OFFGAS CONFINEMENT BOUNDARY IS QUALITY LEVEL Q AND SEISMIC CATEGORY SC-III.
45. PERFORMS AN AIR PERMIT FUNCTION.
46. NOT TO BE INSTALLED WHEN MELTERS ARE PROCESSING WASTE.
47. QUALITY LEVEL Q TO ASSURE OPEN PATH TO PSV.
48. VALVE MEETS QUALITY LEVEL Q AND SEISMIC CATEGORY SC III REQUIREMENTS.
49. DELETED
50. VALVE IS APC.
51. FOR VENDOR COMPONENT DETAILS SEE 24590-LAW-M61-P23T-00001. -00030.
52. THE COMPONENTS SHOWN ON THIS DRAWING IN PHANTOM DO NOT REQUIRE INDEPENDENT QUALIFIED REGISTERED PROFESSIONAL ENGINEER ASSESSMENTS OF DESIGN OR INSTALLATION INSPECTIONS BY A QUALIFIED INSTALLATION INSPECTOR IN ACCORDANCE WITH THE DWP AND/OR WASHINGTON ADMINISTRATIVE CODE REQUIREMENTS.
53. THE DOCUMENT WAS COMPLETELY REVISED AND IDENTIFICATION OF REVISED ITEM IS NOT NECESSARY. REVISED PER 24590-LAW-M6N-LOP-00008, 00015, 00017, 00018, 00022, 00026, 00028, 00033, 00034, 00035, 00037, 00038, 00040, 24590-LAW-M6PR-LOP-00004, 00009, 24590-LAW-M6PN-LOP-00003, 00005, 00007, 24590-LAW-M6N-M80T-00001, 24590-WTP-SDDR-PROC-05-00536 AND 24590-WTP-SDDR-M-06-00291. ADDED MAGNETIC FLOW METER TO LOP PUMP DISCHARGE LINES. ADDED NOZZLES SIZES, INSTRUMENT SERVICE AIR FROM ISA MANIFOLD TO BULGE. UPDATED INSTRUMENT SYMBOLS, REMOVED EQUIPMENT DESCRIPTION OF PSUP-20202 (POWER SUPPLY) AND INCORPORATED VARIOUS EDITORIAL COMMENTS.

PLEASE NOTE THAT SOURCE, SPECIAL NUCLEAR AND BYPRODUCT MATERIALS, AS DEFINED IN THE ATOMIC ENERGY ACT OF 1954 (AEA), ARE REGULATED AT THE U.S. DEPARTMENT OF ENERGY (DOE) FACILITIES EXCLUSIVELY BY DOE ACTING PURSUANT TO ITS AEA AUTHORITY. DOE ASSERTS, THAT PURSUANT TO THE AEA, IT HAS SOLE AND EXCLUSIVE RESPONSIBILITY AND AUTHORITY TO REGULATE SOURCE, SPECIAL NUCLEAR, AND BYPRODUCT MATERIAL AT DOE-OWNED NUCLEAR FACILITIES. INFORMATION CONTAINED HEREIN ON RADIONUCLIDES IS PROVIDED FOR PROCESS DESCRIPTION PURPOSES ONLY.

Q
QUALITY DESIGNATOR

REV	DESCRIPTION	ORG	CHKD	RVWD	APVD	DATE
2	ISSUED FOR PERMITTING USE	[signature]	[signature]	[signature]	[signature]	7/12/07
1	ISSUED FOR PERMITTING USE	MS	EH	EI	KK	5/17/04
0	ISSUED FOR PERMITTING USE	JCR	EH	EI	KK	1/28/04

REVISION HISTORY

ISSUED BY RPP-WTP PDC
ISSUE STAMP

PROJECT No.	24590
SITE	HANFORD
AREA	200E
BUILDING No.	20

RIVER PROTECTION PROJECT
WASTE TREATMENT PLANT
2435 STEVENS CENTER PLACE
RICHLAND, WA 99354

CONTRACT No: DE-AC27-01RV14136

	BY	DATE
ORIGINATOR	JC REWARI	1/26/04
CHECKER	EM HAN	1/26/04
APPROVER	K KHIANEY	1/28/04
REVIEWER	ERIC ISERN	1/26/04

P&ID-LAW PRIMARY OFFGAS PROCESS SYSTEM MELTER 2

CONTENT APPLICABLE TO ALARA? [X] YES [ ] NO
ADR NO. N/A REV: N/A
SAFETY SCREEN REQUIRED? [ ] YES [X] NO E&NS INITIAL IF YES ____

SCALE: NONE
24590-LAW-M6-LOP-P0002
REV 2

SAFETY SCREEN IS REQUIRED FOR DRAWING TYPES IDENTIFIED IN 24590-WTP-GPP-SREG-002

'E' SIZE - 44x34
COMPUTER GENERATED - MANUAL CHANGES NOT PERMITTED

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07/05/2007 08:09:29 AM

PLOTTED BY: eewebb
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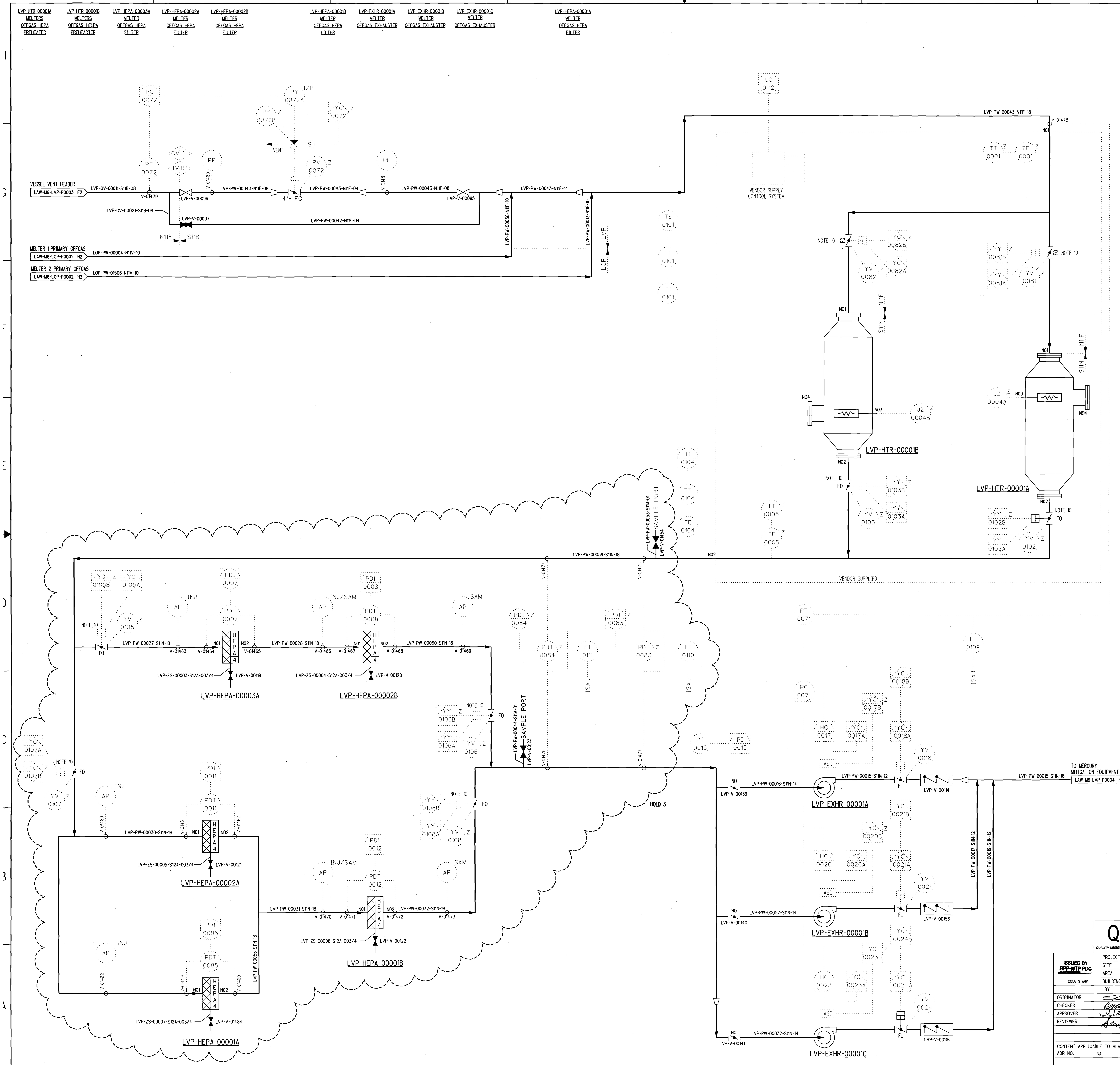
FORM E_SDN.DGN 02/2003



NOTES:

1. SEE DRAWINGS 24590-WTP-M6-50-P0001 THROUGH 24590-WTP-M6-50-P0006 FOR GENERAL NOTES, SYMBOLS AND LEGEND.
2. VENDOR-SUPPLIED EQUIPMENT IS A SKID MOUNTED UNIT.
3. THE OFFGAS SYSTEM PRESSURE CONFINEMENT BOUNDARY AND IT'S INSTRUMENTATION ARE QL-1.
4. DELETED.
5. DELETED.
6. "Z" SUBSCRIPT INSTRUMENTS ARE IMPORTANT TO SAFETY, PERTAINS TO SAFETY DESIGN CLASS/SAFETY DESIGN SIGNIFICANT BUT NOT TO RISK REDUCTION CLASS
7. DELETED.
8. DELETED.
9. DELETED.
10. VALVES INTERLOCKED TO ENSURE THE CONTINUITY OF THE FLOW PATH AND FOR HEATER OPERATION THIS IS AN SDS FUNCTION.
11. DELETED.
12. CONTENTS OF THIS DOCUMENT ARE DANGEROUS WASTE PERMIT AFFECTING.
13. THE PORTIONS OF THIS DRAWING SHOWN IN PHANTOM ARE CONSIDERED NON-PERMIT AFFECTING AND ARE NOT SUBJECT TO THE REGULATORY REQUIREMENTS OF THE WAC CODE FOR THE DANGEROUS WASTE PERMIT TO THE EXTENT THAT THOSE PORTIONS DO NOT IMPACT DANGEROUS WASTE AREAS/OPERATIONS.

HOLD OPEN ITEMS:

1. DELETED.
2. DELETED.
3. HOLD FOR DESIGN INFORMATION AND ISM.
4. DELETED.

12/21/04

PLEASE NOTE THAT SOURCE, SPECIAL NUCLEAR AND BYPRODUCT MATERIALS, AS DEFINED IN THE ATOMIC ENERGY ACT OF 1954 (AEA), ARE REGULATED AT THE U.S. DEPARTMENT OF ENERGY (DOE) FACILITIES EXCLUSIVELY BY DOE ACTING PURSUANT TO ITS AEA AUTHORITY. DOE ASSERTS, THAT PURSUANT TO THE AEA, IT HAS SOLE AND EXCLUSIVE RESPONSIBILITY AND AUTHORITY TO REGULATE SOURCE, SPECIAL NUCLEAR, AND BYPRODUCT MATERIAL AT DOE-OWNED NUCLEAR FACILITIES. INFORMATION CONTAINED HEREIN ON RADIONUCLIDES IS PROVIDED FOR PROCESS DESCRIPTION PURPOSES ONLY.

Q
QUALITY DESIGNATOR

REV	DESCRIPTION	ORG	CHKD	RVWD	APVD	DATE
0	ISSUED FOR PERMITTING	SS	RM			12/21/04

REVISION HISTORY

ISSUED BY RPP-WTP PDC
ISSUE STAMP

PROJECT No.	24590
SITE	HANFORD
AREA	200E
BUILDING No.	20

BECHTEL
RIVER PROTECTION PROJECT
WASTE TREATMENT PLANT
2435 STEVENS CENTER PLACE
RICHLAND, WA 99352

	BY	DATE
ORIGINATOR		12/20/04
CHECKER		12/20/04
APPROVER		12/21/04
REVIEWER		12/21/04

CONTENT APPLICABLE TO ALARA? [X] YES [ ] NO
ADR NO. NA REV:

CONTRACT No: DE-AC27-01RV14136

P&ID-LAW SECONDARY OFFGAS/ VESSEL VENT PROCESS SYSTEM MELTERS SECONDARY OFFGAS Q

SCALE: NONE
24590-LAW-M6-LVP-P0001
REV 0

'E' SIZE - 44x34
COMPUTER GENERATED - MANUAL CHANGES NOT PERMITTED

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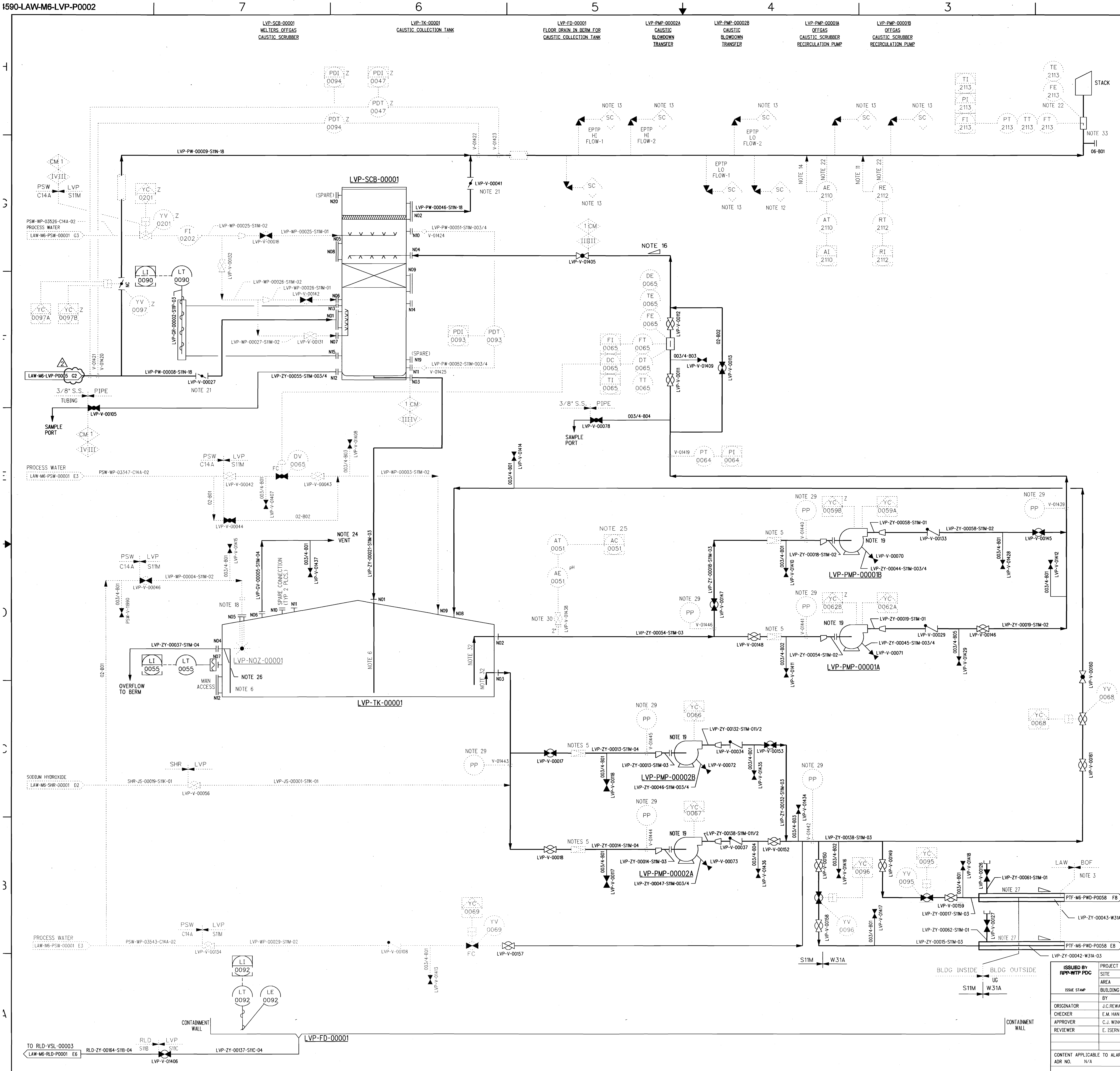
FORM E_SDN.DGN 02/2003



NOTES:

1. SEE DRAWINGS 24590-WTP-M6-50-P0001 THROUGH 24590-WTP-M6-50-P0006 FOR GENERAL NOTES, SYMBOLS AND LEGEND.
2. THE OFFGAS SYSTEM PRESSURE CONFINEMENT BOUNDARY IS QL-1. REFER TO CIS FOR ALL EQUIPMENT AND LINE QUALITY LEVEL DESIGNATION.
3. BATTERY LIMITS FOR PIPING IS 5 FT OUTSIDE LAW FACILITY. BOF IS RESPONSIBLE FOR PIPING BETWEEN PRETREATMENT AND LAW.
4. DELETED.
5. PROVIDE REMOVABLE SPOOL PIECE FOR STARTUP STRAINER. REMOVE STRAINER ELEMENT AFTER SYSTEM FLUSHING AND REPLACE W/SPACER.
6. LINES TO TERMINATE 6 INCHES ABOVE VESSEL BOTTOM HEAD.
7. DELETED.
8. DELETED.
9. DELETED.
10. DELETED.
11. ALPHA/BETA/GAMMA MONITORS PLUS CONTINUOUS IODINE-129 AND C14 SAMPLING FOR MELTER OFFGAS AND VESSEL VENT. RECORD SAMPLE FOR GROSS ALPHA, BETA, GAMMA & ISOTOPIC ANALYSIS SHALL BE PROVIDED, FOR OFFGAS PLUS VESSEL VENT.
12. SAMPLE POINTS AND SPACE FOR POSSIBLE ADDITIONAL REQUIREMENTS FOR THE NON-RADIOLOGICAL MONITORING.
13. TRACER INJECTION POINTS WITH TWO (2) PORTS SPACED AT 90 DEGREES TO EACH OTHER.
14. ANALYZERS SHALL BE PROVIDED TO MONITOR CO, NOX AND TOTAL HYDROCARBON.
15. DELETED.
16. PIPE TO SLOPE FROM HIGHPOINT TO LVP-SCB-00001.
17. FLANGES WITH CAUSTIC SERVICE (CONTENT CODE JS & ZY) WILL BE SUPPLIED WITH SPRAY COVERS.
18. A REMOVABLE SPOOL WILL BE PROVIDED TO FACILITATE SPRAY NOZZLE REMOVAL.
19. LVP-PMP-00001A/1B/2A/2B ARE LOCATED IN THE BERM.
20. CONTENTS OF THIS DOCUMENT ARE DANGEROUS WASTE PERMIT AFFECTING.
21. VALVES WILL BE NORMALLY LOCKED OPEN TO MAINTAIN CONTINUITY OF FLOW.
22. DELETED.
23. DELETED.
24. ROUTE THE VENT INSIDE THE HVAC C2V EXHAUST INTAKE LOCATED IN ROOM L-0218.
25. DELETED.
26. PROVIDE 1/4" SIPHON BREAK HOLE ON TOP OF PIPE AT THE HIGHEST POINT INSIDE THE TANK.
27. THERE WILL BE NO POCKETS ON THE ROUTING WITHIN LAW AND PAST HOSE CONNECTIONS TO PRE-TREATMENT.
28. DELETED.
29. THE PP'S PRESSURE INDICATORS MAY BE REMOVED AFTER START-UP, AND REPLACED W/A THREADED PLUG.
30. SPECIAL BALL VALVE BY C AND I. A 2" FLANGE IS PROVIDED FOR CONNECTION BY C&I.
31. WHENEVER SLOPE IS REQ'D IT SHOULD BE AT LEAST 1:200. FOR DOUBLE PIPE.
32. SUCTION LINES TO TERMINATE 9" ABOVE TANK FLOOR.
33. PLACE NOZZLE IN AN ACCESSIBLE LOCATION TO OPERATOR.
34. THE PORTIONS OF THIS DRAWING SHOWN IN PHANTOM ARE CONSIDERED NON-PERMIT AFFECTING AND ARE NOT SUBJECT TO THE REGULATORY REQUIREMENTS OF THE WAC CODE FOR THE DANGEROUS WASTE PERMIT TO THE EXTENT THAT THOSE PORTIONS DO NOT IMPACT DANGEROUS WASTE AREAS/OPERATIONS.

HOLD/OPEN ITEMS:

1. DELETED.
2. DELETED.
3. DELETED.
4. DELETED.

SID SOURANI
STATE OF WASHINGTON
39097
REGISTERED PROFESSIONAL ENGINEER
EXPIRES: 5/31/05
12/21/04

PLEASE NOTE THAT SOURCE, SPECIAL NUCLEAR AND BYPRODUCT MATERIALS, AS DEFINED IN THE ATOMIC ENERGY ACT OF 1954 (AEA), ARE REGULATED AT THE U.S. DEPARTMENT OF ENERGY (DOE) FACILITIES EXCLUSIVELY BY DOE ACTING PURSUANT TO ITS AEA AUTHORITY. DOE ASSERTS, THAT PURSUANT TO THE AEA, IT HAS SOLE AND EXCLUSIVE RESPONSIBILITY AND AUTHORITY TO REGULATE SOURCE, SPECIAL NUCLEAR, AND BYPRODUCT MATERIAL AT DOE-OWNED NUCLEAR FACILITIES. INFORMATION CONTAINED HEREIN ON RADIONUCLIDES IS PROVIDED FOR PROCESS DESCRIPTION PURPOSES ONLY.

Q
QUALITY DESIGNATOR

REV	DESCRIPTION	ORG	CHKD	RVWD	APVD	DATE
2	ISSUED FOR PERMITTING USE	SSS	RAK	[illegible]	[illegible]	12/21/04
1	ISSUED FOR PERMITTING USE	MS	EH	EI	KK	07/13/04
0	ISSUED FOR PERMITTING USE	JCR	EH	EI	CJW	07/30/03

REVISION HISTORY

ISSUED BY RPP-WTP PDC
ISSUE STAMP

PROJECT No.	24590
SITE	HANFORD
AREA	200E
BUILDING No.	20

	BY	DATE
ORIGINATOR	J.C.REWARI	07/24/03
CHECKER	E.M. HAN	07/24/03
APPROVER	C.J. WINKLER	07/30/03
REVIEWER	E. ISERN	07/28/03

CONTENT APPLICABLE TO ALARA? [X] YES [ ] NO
ADR NO. N/A REV:

BECHTEL
RIVER PROTECTION PROJECT
WASTE TREATMENT PLANT
2435 STEVENS CENTER PLACE
RICHLAND, WA 99352

CONTRACT No: DE-AC27-01RV14136

P&ID - LAW SECONDARY OFFGAS/ VESSEL VENT PROCESS SYSTEM AND STACK DISCHARGE MONITORING SYSTEM (Q)

SCALE: NONE
24590-LAW-M6-LVP-P0002
REV 2

FORM E_SDN.DGN 02/2003

'E' SIZE - 44x34
COMPUTER GENERATED - MANUAL CHANGES NOT PERMITTED

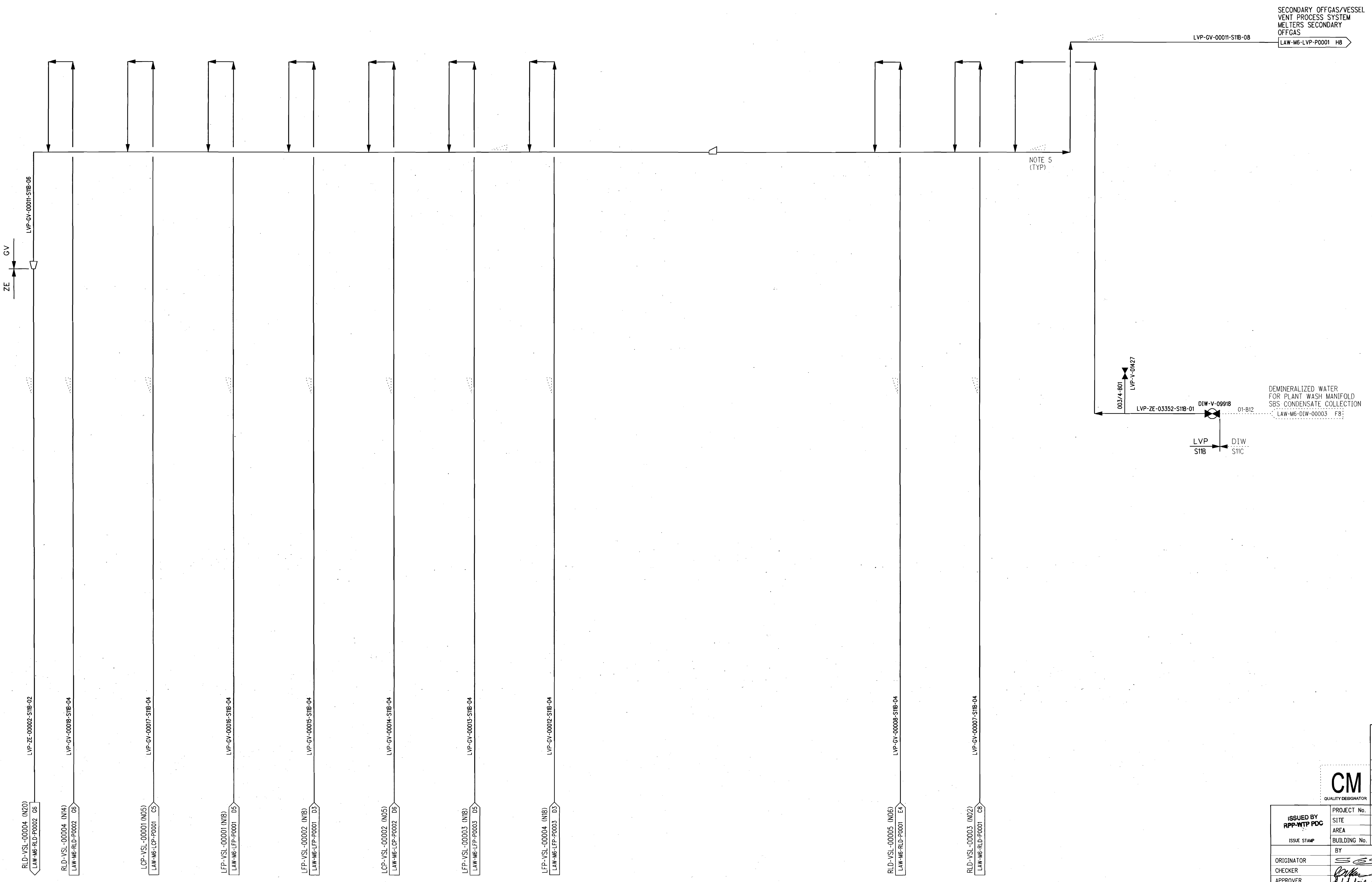
R10449924

12/20/2004 01:03:13 PM

PLOTTED BY: wmahoney
C:\Work\dms05069\LAWM6LVPP0002R2.dgn

NOTES:

1. SEE DRAWING 24590-WTP-M6-50-P0001 THROUGH 24590-WTP-M6-P0006 FOR GENERAL NOTES, SYMBOLS, AND LEGEND.
2. ALL SSC'S ARE SC-III AND SHALL BE DESIGNED ACCORDING TO ENGINEERING SPECIFICATION 24590-WTP-3PS-FB01-T0001.
3. ALL SYSTEMS AND COMPONENTS ON THIS DRAWING ARE NON-QUALITY RELATED.
4. DELETED.
5. SLOPE PIPING 1:200 MINIMUM UNLESS OTHERWISE NOTED.
6. CONTENTS OF THIS DOCUMENT ARE DANGEROUS WASTE PERMIT AFFECTING.
7. DELETED.
8. THE PORTIONS OF THIS DRAWING SHOWN IN PHANTOM ARE CONSIDERED NON-PERMIT AFFECTING AND ARE NOT SUBJECT TO THE REGULATORY REQUIREMENTS OF THE WAC CODE FOR THE DANGEROUS WASTE PERMIT TO THE EXTENT THAT THOSE PORTIONS DO NOT IMPACT DANGEROUS WASTE AREAS/OPERATIONS.



SID SOURANT · STATE OF WASHINGTON · REGISTERED PROFESSIONAL ENGINEER
11/15/04
EXPIRES: 5/31/05

PLEASE NOTE THAT SOURCE, SPECIAL NUCLEAR AND BYPRODUCT MATERIALS, AS DEFINED IN THE ATOMIC ENERGY ACT OF 1954 (AEA), ARE REGULATED AT THE U.S. DEPARTMENT OF ENERGY (DOE) FACILITIES EXCLUSIVELY BY DOE ACTING PURSUANT TO ITS AEA AUTHORITY. DOE ASSERTS, THAT PURSUANT TO THE AEA, IT HAS SOLE AND EXCLUSIVE RESPONSIBILITY AND AUTHORITY TO REGULATE SOURCE, SPECIAL NUCLEAR, AND BYPRODUCT MATERIAL AT DOE-OWNED NUCLEAR FACILITIES. INFORMATION CONTAINED HEREIN ON RADIONUCLIDES IS PROVIDED FOR PROCESS DESCRIPTION PURPOSES ONLY.

CM
QUALITY DESIGNATOR

REV	DESCRIPTION	ORG	CHKD	RVWD	APVD	DATE
0	ISSUED FOR PERMITTING USE	SGS				11/16/04

REVISION HISTORY

ISSUED BY RPP-WTP PDC

ISSUE STAMP

PROJECT No.	24590
SITE	HANFORD
AREA	200E
BUILDING No.	20

RIVER PROTECTION PROJECT
WASTE TREATMENT PLANT
2435 STEVENS CENTER PLACE
RICHLAND, WA 99352

CONTRACT No: DE-AC27-01RV14136

	BY	DATE
ORIGINATOR	SGS	11/15/04
CHECKER		11/16/04
APPROVER		11/16/04
REVIEWER		11/16/04

CONTENT APPLICABLE TO ALARA? XX YES NO
ADR NO. NA REV:

P&ID - LAW SECONDARY OFFGAS / VESSEL VENT PROCESS SYSTEM EQUIPMENT VENTS

SCALE: NONE
24590-LAW-M6-LVP-P0003
REV 0

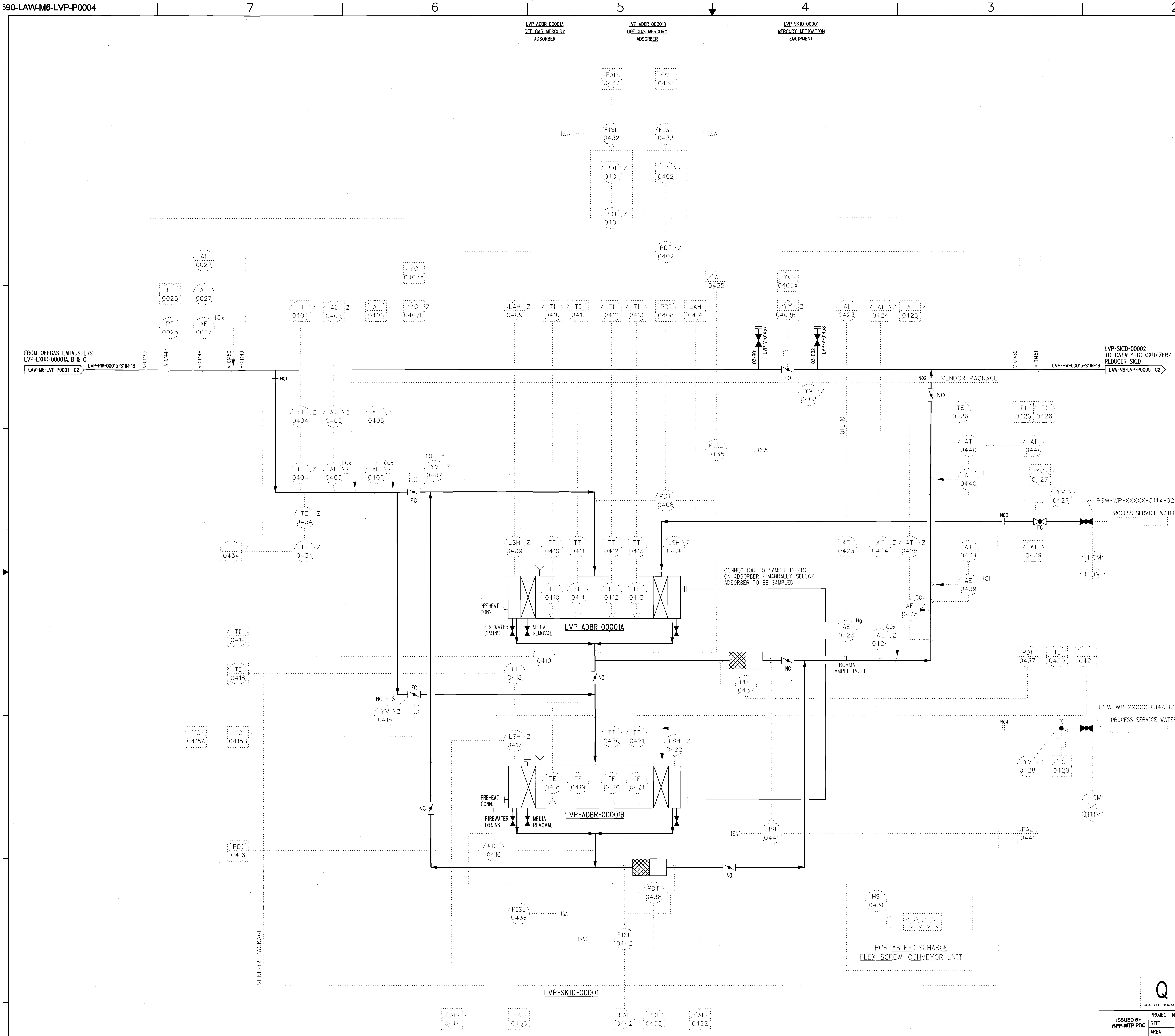
'E' SIZE - 44x34
COMPUTER GENERATED - MANUAL CHANGES NOT PERMITTED

R10435357

11/16/2004 08:29:18 AM

PLOTTED BY: wmahoney
C:\Work\dms05069\LAWM6LVPP0003R1.dgn

FORM E_SDN.DGN 02/2003



NOTES:

1. SEE DRAWINGS 24590-WTP-M6-50-P0001 THROUGH 24590-WTP-M6-50-P0006 FOR GENERAL NOTES, SYMBOLS AND LEGEND.
2. VENDOR-SUPPLIED EQUIPMENT IS A SKID MOUNTED UNIT.
3. THE OFFGAS SYSTEM AND IT'S INSTRUMENTATION PRESSURE CONFINEMENT BOUNDARY IS QL-1 AND SEISMIC III. REFER TO CIS FOR ALL EQUIPMENT AND LINE QUALITY LEVEL DESIGNATION.
4. DELETED.
5. "Z" SUBSCRIPT INSTRUMENTS ARE IMPORTANT TO SAFETY, PERTAINS TO SAFETY DESIGN CLASS/SAFETY DESIGN SIGNIFICANT BUT NOT TO RISK REDUCTION CLASS
6. DELETED.
7. DELETED.
8. VALVES YV0407 AND YV0415 MUST BE ANSI CLASS IV BUBBLE TIGHT.
9. ROOT VALVES ARE SHOWN BY THE SYMBOL .
10. NOT BY SELLER.
11. CONTENTS OF THIS DOCUMENT ARE DANGEROUS WASTE PERMIT AFFECTING.
12. THE PORTIONS OF THIS DRAWING SHOWN IN PHANTOM ARE CONSIDERED NON-PERMIT AFFECTING AND ARE NOT SUBJECT TO THE REGULATORY REQUIREMENTS OF THE WAC CODE FOR THE DANGEROUS WASTE PERMIT TO THE EXTENT THAT THOSE PORTIONS DO NOT IMPACT DANGEROUS WASTE AREAS/OPERATIONS.

HOLD OPEN ITEMS:

1. DELETED.
2. DELETED.
3. DELETED.

REFERENCES:

SID SOURANI
STATE OF WASHINGTON
REGISTERED PROFESSIONAL ENGINEER
EXPIRES 5/31/05
12/21/04

Q
QUALITY DESIGNATOR

REV	DESCRIPTION	ORG	CHKD	RVWD	APVD	DATE
0	ISSUED FOR PERMITTING USE	SGS	[illegible]	[illegible]	[illegible]	12/21/04

REVISION HISTORY

ISSUED BY RPP-WTP PDC		
	PROJECT No.	24590
	SITE	HANFORD
	AREA	200E
ISSUE STAMP	BUILDING No.	20

BECHTEL
RIVER PROTECTION PROJECT
WASTE TREATMENT PLANT
2435 STEVENS CENTER PLACE
RICHLAND, WA 99352

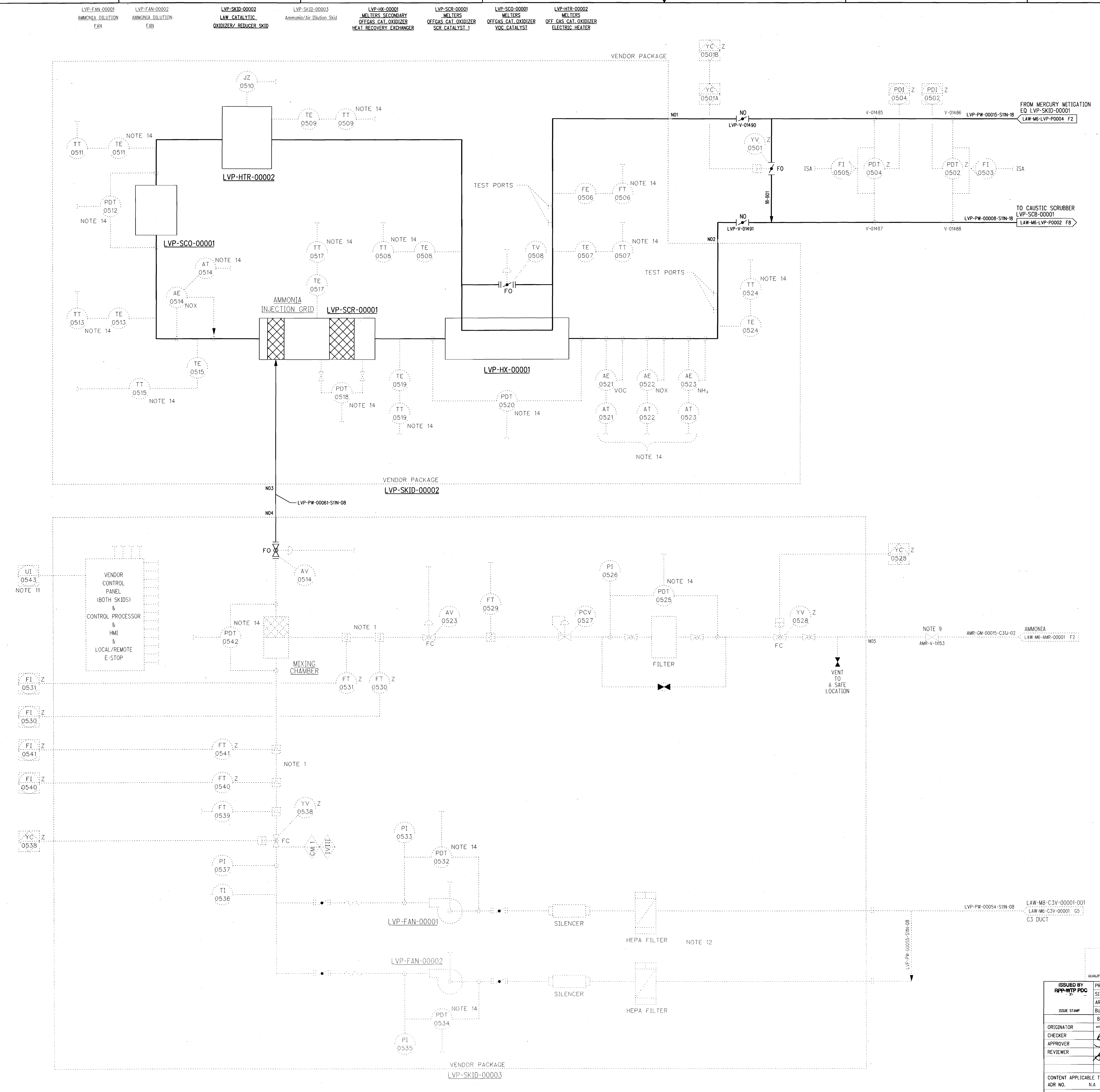
CONTRACT No: DE-AC27-01RV14136

	BY	DATE
ORIGINATOR	SGS	12/21/04
CHECKER	[illegible]	12/21/04
APPROVER	[illegible]	12/21/04
REVIEWER	[illegible]	12/21/04

CONTENT APPLICABLE TO ALARA? [X] YES [ ] NO
ADR NO. NA REV:

P&ID-LAW MELTERS SECONDARY OFFGAS, VESSEL VENT PROCESS SYSTEM MERCURY MITIGATION EQUIPMENT

SCALE: NONE
24590-LAW-M6-LVP-P0004
REV 0



NOTES:

1. ITS MONITOR OF AMMONIA TO AIR RATIO TO ENSURE MIXTURE IS MAINTAINED BELOW LOWER FLAMMABILITY LEVEL. VENDOR TO RATIO FLOWS TO MAINTAIN AMMONIA TO AIR RATIO BELOW LOWER FLAMMABILITY LEVEL.
2. SEE DWG 24590-WTP-M6-50-P0001 THROUGH 24590-WTP-M6-50-P0006 FOR GENERAL NOTES, SYMBOLS AND LEGEND.
3. THE OFFGAS SYSTEM PRESSURE CONFINEMENT BOUNDRY AND ITS INSTRUMENTATION IS QL-1.
4. DELETED.
5. "Z" SUBSCRIPT INSTRUMENTS ARE IMPORTANT TO SAFETY, PERTAINS TO SAFETY DESIGN CLASS/SAFETY DESIGN SIGNIFICANT/SAFETY SIGNIFICANT BUT NOT TO RISK REDUCTION CLASS.
6. DELETED.
7. DELETED.
8. DELETED.
9. VALVE SHALL BE ACCESSIBLE TO THE OPERATOR. (OUTSIDE OF OFFGAS ROOM/NO_X HAZARDS).
10. CONTENTS OF THIS DRAWING ARE DANGEROUS WASTE PERMIT AFFECTING.
11. VENDOR TO PROVIDE ALL TRANSMITTER VALUES AND OUTPUT VALUES TO THE ICN VIA PROFI BUS CONNECTION LVP-UI-0543.
12. THESE HEPA FILTERS ARE AIR PERMIT AFFECTING AND TESTABLE.
13. DELETED.
14. TEMPERATURE, DIFFERENTIAL PRESSURE AND ANALYTICAL TRANSMITTERS WILL BE RACK MOUNTED IN ADJACENT ROOM.
15. THE PORTIONS OF THIS DRAWING SHOWN IN PHANTOM ARE CONSIDERED NON-PERMIT AFFECTING AND ARE NOT SUBJECT TO THE REGULATORY REQUIREMENTS OF THE WAC CODE FOR THE DANGEROUS WASTE PERMIT TO THE EXTENT THAT THOSE PORTIONS DO NOT IMPACT DANGEROUS WASTE AREAS/OPERATIONS.

HOLD OPEN ITEMS:

1. DELETED.
2. DELETED.

REFERENCES:

12/21/04

PLEASE NOTE THAT SOURCE, SPECIAL NUCLEAR AND BYPRODUCT MATERIALS, AS DEFINED IN THE ATOMIC ENERGY ACT OF 1954 (AEA), ARE REGULATED AT THE U.S. DEPARTMENT OF ENERGY (DOE) FACILITIES EXCLUSIVELY BY DOE ACTING PURSUANT TO ITS AEA AUTHORITY. DOE ASSERTS, THAT PURSUANT TO THE AEA, IT HAS SOLE AND EXCLUSIVE RESPONSIBILITY AND AUTHORITY TO REGULATE SOURCE, SPECIAL NUCLEAR, AND BYPRODUCT MATERIAL AT DOE-OWNED NUCLEAR FACILITIES. INFORMATION CONTAINED HEREIN ON RADIONUCLIDES IS PROVIDED FOR PROCESS DESCRIPTION PURPOSES ONLY.

Q
QUALITY DESIGNATOR

REV	DESCRIPTION	ORG	CHKD	RVWD	APVD	DATE
0	ISSUED FOR PERMITTING USE	SGS				12/21/04

REVISION HISTORY

ISSUED BY RPP-WTP PDC	PROJECT No.	24590
	SITE	HANFORD
	AREA	200E
ISSUE STAMP	BUILDING No.	20

	BY	DATE
ORIGINATOR	SGS	12/21/04
CHECKER		12/21/04
APPROVER		12/21/04
REVIEWER		12/21/04

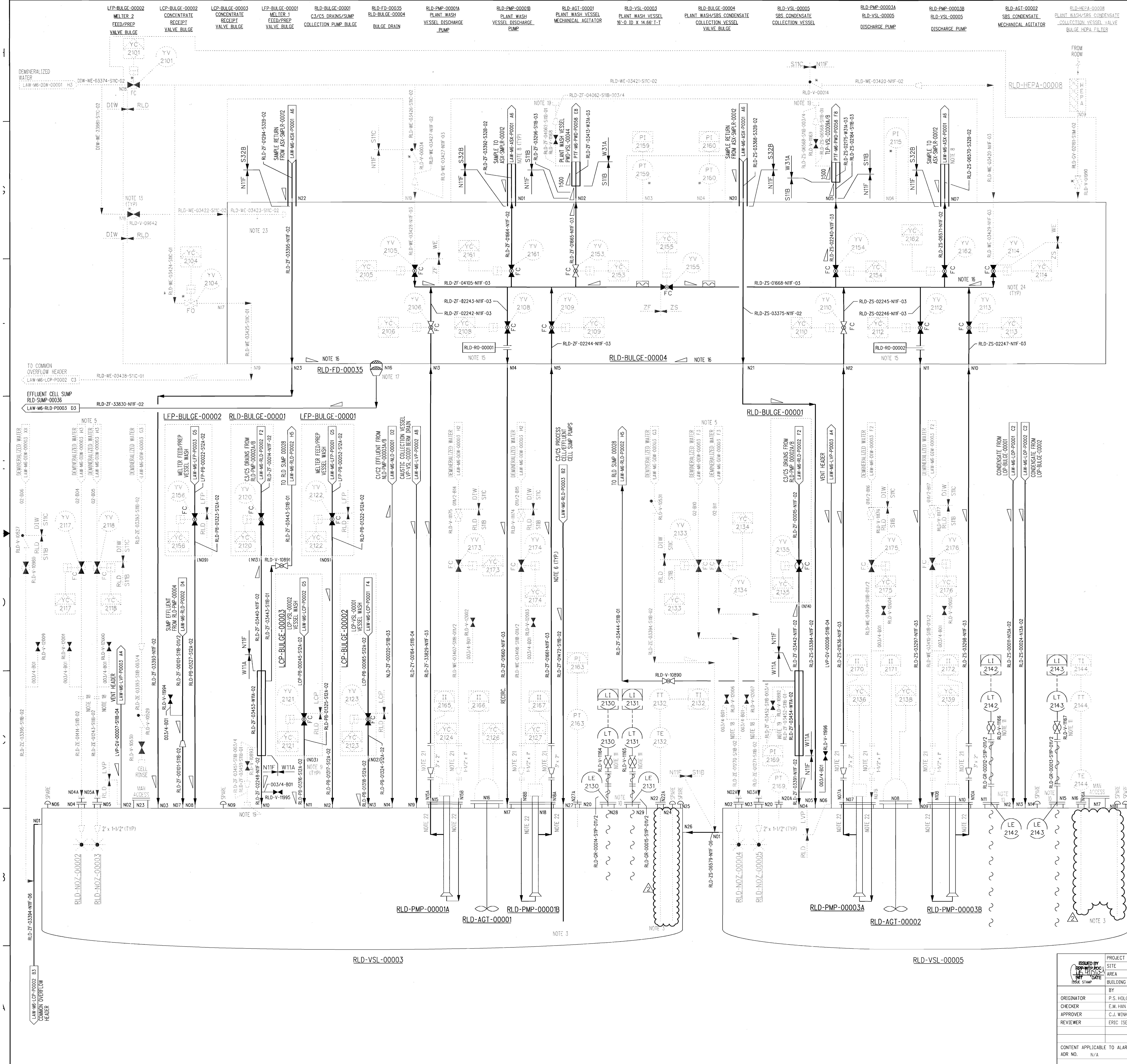
CONTENT APPLICABLE TO ALARA? [X] YES [ ] NO
ADR NO. N.A REV:

BECHTEL
RIVER PROTECTION PROJECT
WASTE TREATMENT PLANT
2435 STEVENS CENTER PLACE
RICHLAND, WA 99352

CONTRACT No: DE-AC27-01RV14136

P&ID-LAW MELTERS SECONDARY OFFGAS VESSEL VENT PROCESS SYSTEM SCR, VOC & AMMONIA DILUTION PACKAGES

SCALE: NONE | 24590-LAW-M6-LVP-P0005 | REV 0



NOTES:

1. SEE DRAWINGS 24590-WTP-M6-50-P0001 THROUGH 24590-WTP-M6-50-P0006 FOR GENERAL NOTES, SYMBOLS AND LEGENDS.
2. ALL SYSTEMS AND COMPONENTS SHOWN ON THIS DRAWING ARE NON-QUALITY RELATED (CM).
3. LINES TO TERMINATE 6 INCHES ABOVE VESSEL BOTTOM HEAD.
4. DELETED
5. NaOH FOR PH ADJUSTMENT CAN BE ADDED FROM WASH CART VIA WASH NOZZLES, IF NECESSARY.
6. SLOPE 1:200 (MINIMUM) UNLESS OTHERWISE NOTED.
7. DELETED.
8. SAMPLING SYSTEM DETAILS ARE TO BE DETERMINED.
9. NOZZLE NUMBER SHOWN IN PARENTHESIS IS A REFERENCE TO THE ACTUAL NOZZLE NUMBER THAT PHYSICALLY EXISTS ON THE ASSOCIATED DRAWING.
10. RADAR GUIDE TUBE IS TO BE ROUTED TO THE FLOOR ABOVE.
11. FULL PORT BALL VALVES REQUIRED.
12. DELETED.
13. VALVES AND INSTRUMENTATION INDICATED WITH (*) AND PIPING INSIDE THE PHANTOM LINE ARE LOCATED OUTSIDE THE BULGE AND PROVIDED BY THE BULGE VENDOR.
14. DELETED.
15. WELDED RESTRICTION ORIFICE MACHINED FROM BAR STOCK.
16. SLOPE BULGE FLOOR 1:100 TOWARDS THE DRAIN. BULGE PIPING PIPEWORK SLOPE IS 1:50 MINIMUM.
17. STRAINER IS DESIGNED FOR MECHANICAL REMOVAL FROM THE BULGE EXTERIOR.
18. SPOOL PIECE TO FACILITATE SPRAY NOZZLE REMOVAL.
19. LOCATE HOSE CONNECTION IN CORRIDOR AT ELEVATION 3'-0".
20. CONTENTS OF THIS DOCUMENT ARE DANGEROUS WASTE PERMIT AFFECTING.
21. SPOOL PIECE TO FACILITATE PUMP REMOVAL.
22. VESSEL INTERNAL PUMP PRIMING AND DISCHARGE PIPING SUPPLIED WITH PUMP BY PUMP VENDOR.
23. SPRAY NOZZLES PROVIDED BY BULGE VENDOR.
24. PLUG VALVES LOCATED IN BULGES TO BE 316SS, BUTT WELD END, AND PROVIDED BY BULGE VENDOR.
25. DELETED.
26. THE PORTIONS OF THIS DRAWING SHOWN IN PHANTOM ARE CONSIDERED NON-PERMIT AFFECTING AND ARE NOT SUBJECT TO THE REGULATORY REQUIREMENTS OF THE WAC CODE FOR THE DANGEROUS WASTE PERMIT TO THE EXTENT THAT THOSE PORTIONS DO NOT IMPACT DANGEROUS WASTE AREAS/OPERATION.
27. CHANGES INCORPORATED INTO REVISION 1 INCLUDE:
    - CHANGED DIW FLUSH TO NON-REGULATED STATUS.
    - CORRECTED STATUS OF YC-2112 & YC-2113 OPERATORS.
28. CHANGES INCORPORATED INTO REVISION 2 INCLUDE:
    - THERMOWELL AND DIP PIPE IN VESSELS CHANGED TO NON-REGULATED.

2

HOLD/OPEN ITEMS:

1. DELETED.
2. DELETED.
3. DELETED.

EXPIRES: 07/28/05

4/2/04

PLEASE NOTE THAT SOURCE, SPECIAL NUCLEAR AND BYPRODUCT MATERIALS, AS DEFINED IN THE ATOMIC ENERGY ACT OF 1954 (AEA), ARE REGULATED AT THE U.S. DEPARTMENT OF ENERGY (DOE) FACILITIES EXCLUSIVELY BY DOE ACTING PURSUANT TO ITS AEA AUTHORITY. DOE ASSERTS, THAT PURSUANT TO THE AEA, IT HAS SOLE AND EXCLUSIVE RESPONSIBILITY AND AUTHORITY TO REGULATE SOURCE, SPECIAL NUCLEAR, AND BYPRODUCT MATERIAL AT DOE-OWNED NUCLEAR FACILITIES. INFORMATION CONTAINED HEREIN ON RADIONUCLIDES IS PROVIDED FOR PROCESS DESCRIPTION PURPOSES ONLY.

CM
QUALITY DESIGNATOR

REV	DESCRIPTION	ORG	CHKD	RVWD	APVD	DATE
2	ISSUED FOR PERMITTING USE					4/14/04
1	ISSUED FOR PERMITTING USE	PSH	EH	EI	KK	11/11/03
0	ISSUED FOR PERMITTING USE	PJH	EH	EI	CJW	7/31/02

REVISION HISTORY

ISSUED BY RPP-WTP PDC
INIT DATE
ISSUE STAMP

PROJECT No.	24590
SITE	HANFORD
AREA	200E
BUILDING No.	20

	BY	DATE
ORIGINATOR	P.S. HOLGADO	07-29-03
CHECKER	E.M. HAN	07-29-03
APPROVER	C.J. WINKLER	07-30-03
REVIEWER	ERIC ISERN	7/29/03

CONTENT APPLICABLE TO ALARA? [X] YES [ ] NO
ADR NO. N/A REV:

BECHTEL
RIVER PROTECTION PROJECT
WASTE TREATMENT PLANT
2435 STEVENS CENTER PLACE
RICHLAND, WA 99352

CONTRACT No: DE-AC27-01RV14136

P&ID - LAW
RADIOACTIVE LIQUID WASTE DISPOSAL SYSTEM
PLANT WASH & SBS CONDENSATE COLLECTION

SCALE: NONE | 24590-LAW-M6-RLD-P0001 | REV 2

FORM E_SDN.DGN 02/2003

'E' SIZE - 44x34
COMPUTER GENERATED - MANUAL CHANGES NOT PERMITTED

04/08/2004 10:50:17 AM

R10285056

PLOTTED BY: wmahoney
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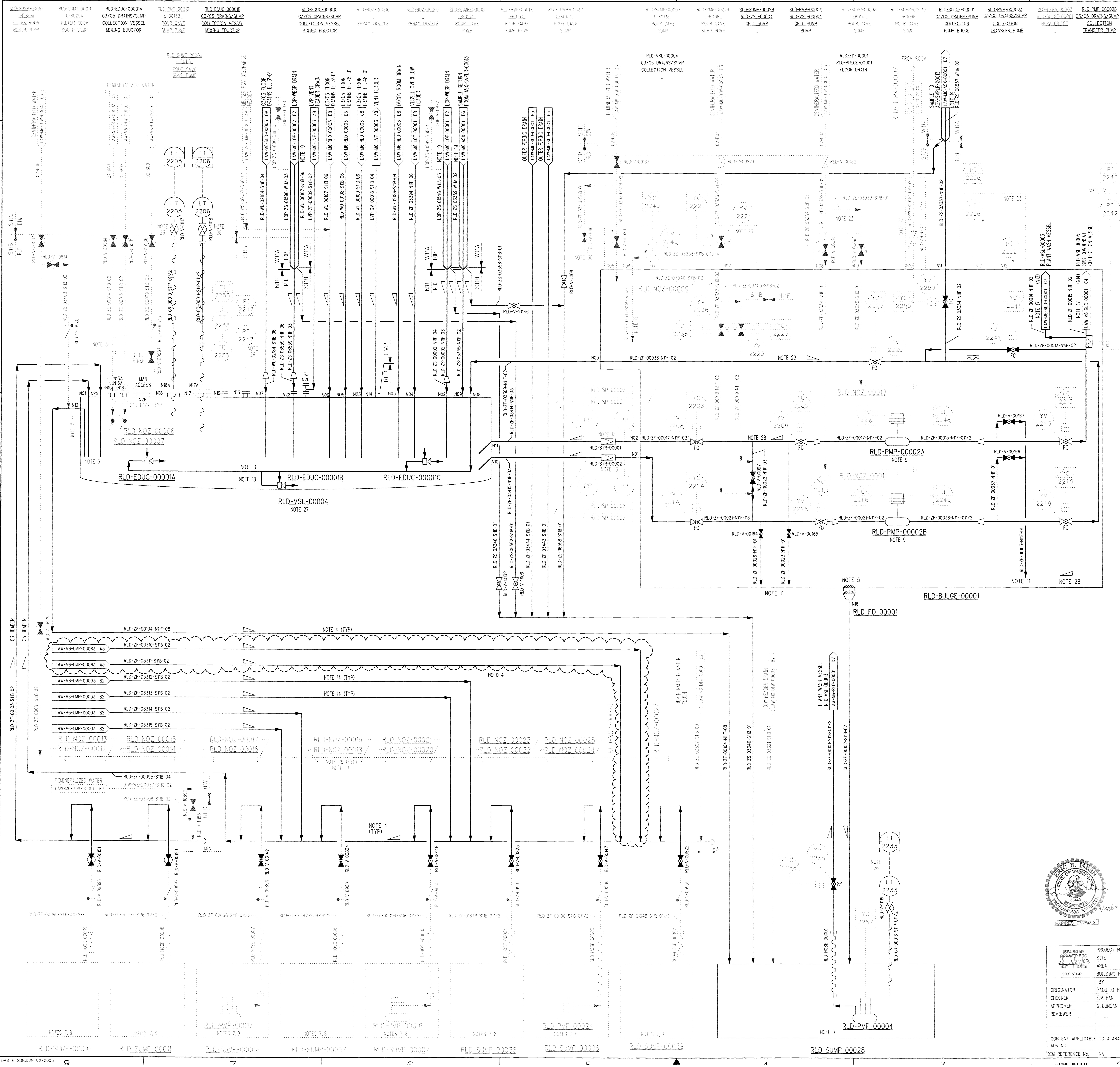


NOTES:

1. SEE DRAWINGS 24590-WTP-M6-50-00001 THROUGH 24590-WTP-M6-50-00006 FOR GENERAL NOTES, SYMBOLS AND LEGEND.
2. ALL SYSTEMS AND COMPONENTS SHOWN ON THIS DRAWING ARE NON-QUALITY RELATED.
3. ALL DIPPED NON-INSTRUMENT LINES TERMINATE INSIDE THE VESSEL AT 6 INCHES ABOVE THE VESSEL BOTTOM HEAD.
4. SLOPE 1:500 (MINIMUM) UNLESS OTHERWISE NOTED.
5. STRAINER IS DESIGNED FOR MECHANICAL REMOVAL FROM THE BULGE EXTERIOR.
6.

C3/C5 SUMPS		
SUMP	LOCATION	PUMP
RLD-SUMP-00028 NOTE 7	RLD-VSL-00004 CELL	RLD-PMP-00004
RLD-SUMP-00010 NOTE 7	L-B029A FILTER ROOM (N)	NOTE 8
RLD-SUMP-00011 NOTE 7	L-B029A FILTER ROOM (S)	NOTE 8

C5 SUMPS		
SUMP	LOCATION	PUMP
RLD-SUMP-00006 NOTE 7	L-B011B POUR CAVE	RLD-PMP-00024 NOTE 8
RLD-SUMP-00007 NOTE 7	L-B013B POUR CAVE	RLD-PMP-00016 NOTE 8
RLD-SUMP-00008 NOTE 7	L-B015A POUR CAVE	RLD-PMP-00017 NOTE 8
RLD-SUMP-00037 NOTE 7	L-B013C POUR CAVE	NOTE 8
RLD-SUMP-00038 NOTE 7	L-B011C POUR CAVE	RLD-PMP-00024 NOTE 8
RLD-SUMP-00039 NOTE 7	L-B009B POUR CAVE	NOTE 8

7. SUMP RLD-SUMP-00028 IS 24" DIA X 30" DEEP. POUR CAVE SUMPS ARE 18" WIDE X 18" LONG X 6" DEEP. SUMPS RLD-SUMP-00010 AND RLD-SUMP-00011 ARE 18" DIA. X 30"DEEP.
8. PORTABLE WAREHOUSE PUMPS. A TOTAL OF 3 PORTABLE WAREHOUSE PUMPS WILL BE PROVIDED FOR C3 AND C5 AREAS.
9. LOCATE PUMP SUCTION BULGE NOZZLE 2'-11" FROM TOP OF CONCRETE.
10. A SINGLE CELL WASH HEADER PROVIDES SPRAY FOR THE TOTAL PERIMETER FOR C3/C5 DRAIN TANK CELL ROOM L-B001B.
11. TERMINATE PIPING ABOVE THE BULGE FLOOR NEAR THE DRAIN.
12. DELETED
13. WELDED TEE STRAINERS WILL BE REMOVED PRIOR TO STARTUP AND REPLACED WITH N11F PIPING PER SPECIFICATION. STRAINER IS LOCATED INSIDE THE CELL.
14. CHECK VALVES FOR THE MELTER COOLING PANEL DRAIN LINES ARE SHOWN IN THE MELTER P&ID'S.
15. PROVIDE A 1/2 INCH DIA HOLE AS SIPHON BREAKER.
16. DELETED
17. NOZZLE NUMBER SHOWN IN PARENTHESIS IS A REFERENCE TO THE ACTUAL NOZZLE NUMBER THAT PHYSICALLY EXISTS ON THE ASSOCIATED DRAWING.
18. EDUCTOR TO POINT DOWNWARD FOR SOLIDS AGITATION.
19. DOUBLE WALLED PIPING REQUIRED IN C1/C2 AREAS. DOUBLE WALLED PIPING TO TERMINATE INSIDE C5 ROOM (L-B001B).
20. DELETED
21. DELETED
22. HORIZONTAL SECTION OF LINE TO SLOPE TOWARDS THE VESSEL FROM HIGH POINT OF VERTICAL LINE.
23. VALVES AND INSTRUMENTATION INDICATED WITH (*) AND PIPING INSIDE THE PHANTOM LINE ARE LOCATED OUTSIDE THE BULGE AND PROVIDED BY THE BULGE VENDOR.
24. DELETED.
25. THE REQUIRED BATCH SEQUENCES, PERMISSIVES, INTERLOCK, ALARMS AND OPERATOR INTERFACE POINTS ARE FULLY DESCRIBED IN THE SOFTWARE FUNCTIONAL SPECIFICATION, FOR RLD-RADIOACTIVE LIQUID WASTE DISPOSAL SYSTEM, 24590-LAW-3PS-RLD-T0001.
26. PROVISION FOR MANUAL FLUSHING USING DEMINERALIZED WATER IS REQUIRED. FULL PORT VALVES REQUIRED.
27. ALL VESSEL INTERNAL PIPING IS CONSTRUCTED OF 316L SS.
28. SLOPE BULGE FLOOR 1:100 TOWARDS THE DRAIN. BULGE PIPING PIPEWORK SLOPE IS 1:50 MINIMUM.
29. 16 SPRAY NOZZLES SPACED ON 5'-0" CENTERS.
30. FLUSH LINE FOR RADAR TUBE FOR SUMP RLD-SUMP-00028.
31. SPOOL PIECE TO FACILITATE SPRAY NOZZLE REMOVAL.
32. DELETED
33. THE PORTIONS OF THIS DRAWING SHOWN IN PHANTOM ARE CONSIDERED NON-PERMIT AFFECTING AND ARE NOT SUBJECT TO THE REGULATORY REQUIREMENTS OF THE WAC CODE FOR THE DANGEROUS WASTE PERMIT TO THE EXTENT THAT THOSE PORTIONS DO NOT IMPACT DANGEROUS WASTE AREAS/OPERATIONS.

HOLD/OPEN ITEMS:

1. DELETED
2. DELETED
3. DELETED
4. HOLD PENDING PLANT DESIGN INPUT.

ERIC B. ISERN
STATE OF WASHINGTON
33449
REGISTERED PROFESSIONAL ENGINEER
3/27/03
EXPIRES: 07/28/03

REV	DESCRIPTION	ORG	CHKD	RVWD	APVD	DATE
2	MAJOR REVISION, ISSUED FOR PERMITTING USE		EMH			3/27/03
1	MAJOR REVISION, ISSUED FOR PERMITTING USE	PSH	EMH	GD		10/8/02
0	ISSUED FOR PERMITTING USE	PSH	EMH	GD		7/26/02

REVISION HISTORY

ISSUED BY RPP-WTP PDC
3/27/03
INIT DATE
ISSUE STAMP

PROJECT No.	24590	
SITE	HANFORD	
AREA	200E	
BUILDING No.	20	
	BY	DATE
ORIGINATOR	PAQUITO HOLGADO	7/25/02
CHECKER	E.M. HAN	7/25/02
APPROVER	G. DUNCAN	7/26/02
REVIEWER		

CONTENT APPLICABLE TO ALARA? YES NO
ADR NO. REV:
DIM REFERENCE No. NA

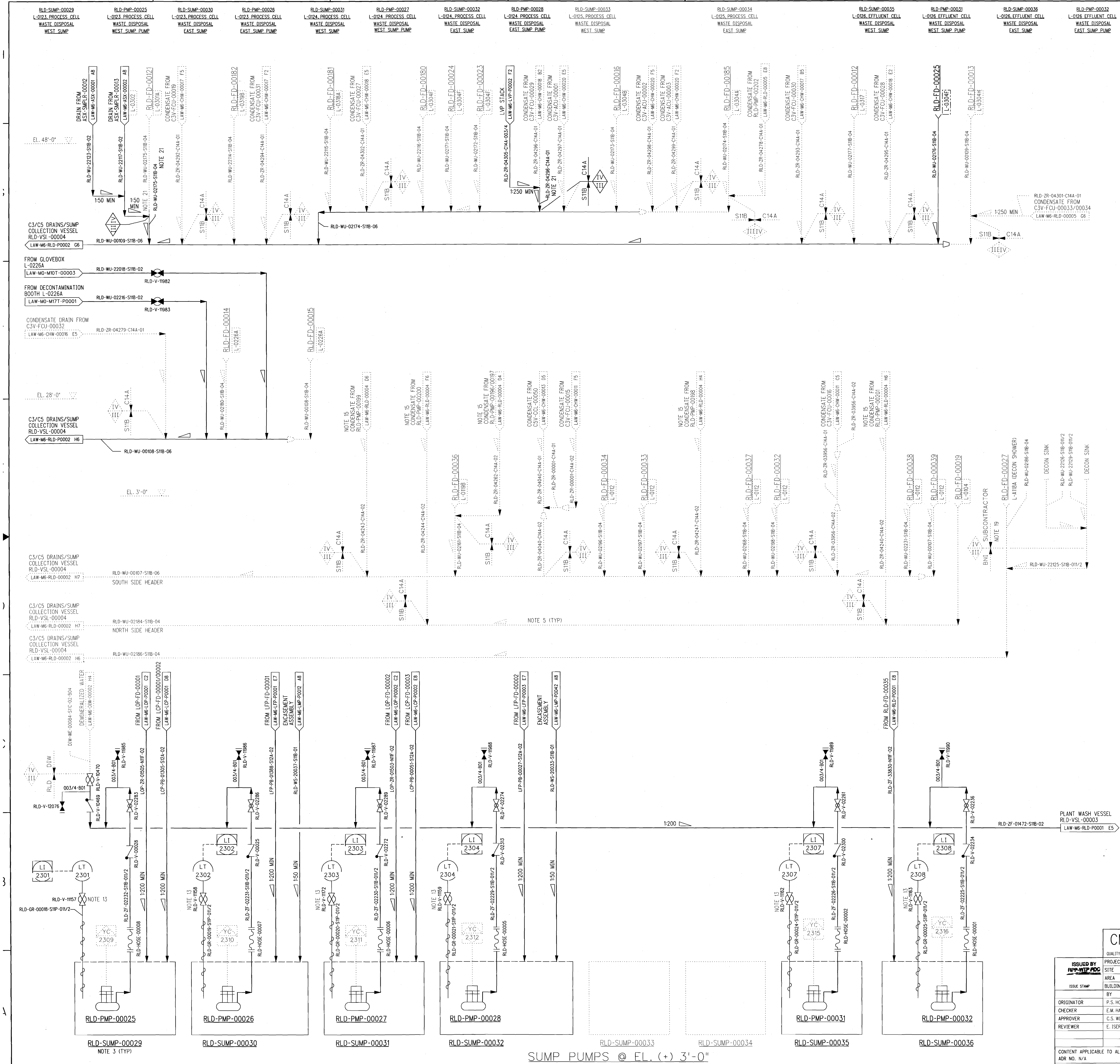
BECHTEL
RIVER PROTECTION PROJECT
WASTE TREATMENT PLANT
2435 STEVENS CENTER PLACE
RICHLAND, WA 99352

CONTRACT No: DE-AC27-01RV14136

P&ID-LAW RADIOACTIVE LIQUID WASTE DISPOSAL SYSTEM C3/C5 DRAINS/SUMP COLLECTION

SCALE: NONE
24590-LAW-M6-RLD-P0002
REV 2

'E' SIZE - 44x34
WHEN REFERENCING DRAWING AND DIM NUMBERS
03/27/2003 05:12:08 PM
PLOTTED BY: swagner1



NOTES:

1. SEE DRAWINGS 24590-WTP-M6-50-P0001 THROUGH 24590-WTP-M6-50-P0008 FOR GENERAL NOTES, SYMBOLS AND LEGEND, AND GENERAL SLOPE REQUIREMENTS.
2. ALL SYSTEMS AND COMPONENTS SHOWN ON THIS DRAWING ARE NON-QUALITY RELATED (CM) AND SEISMIC CATEGORY III UNLESS OTHERWISE INDICATED.
3. THESE PUMPS ARE PERMANENTLY INSTALLED IN THE SUMPS. ALL SUMPS SHOWN ON THIS DRAWING ARE 30 INCHES DIAMETER BY 15 INCHES DEEP.
4. ONE FLOOR DRAIN FOR EACH 1500 SQ. FT. OF FIRE PROTECTION SPRINKLER WATER COLLECTION AREA WILL BE PROVIDED AS A MINIMUM.
5. A MINIMUM SLOPE OF 1:400 SHALL BE PROVIDED FOR ALL LINES, EXCEPT WHERE OTHERWISE NOTED. CONDENSATE DRAIN LINES FROM PUMPING TRAPS SHALL HAVE A MINIMUM SLOPE OF 1:250.
6. DELETED
7. DELETED
8. DELETED
9.

C5 SUMPS		
SUMP	LOCATION	PUMP
RLD-SUMP-00029	L-0123 PROCESS CELL (WEST END)	RLD-PMP-00025
RLD-SUMP-00030	L-0123 PROCESS CELL (EAST END)	RLD-PMP-00026
RLD-SUMP-00031	L-0124 PROCESS CELL (WEST END)	RLD-PMP-00027
RLD-SUMP-00032	L-0124 PROCESS CELL (EAST END)	RLD-PMP-00028
RLD-SUMP-00033	L-0125 PROCESS CELL (WEST END)	
RLD-SUMP-00034	L-0125 PROCESS CELL (EAST END)	
RLD-SUMP-00035	L-0126 EFFLUENT CELL (WEST END)	RLD-PMP-00031
RLD-SUMP-00036	L-0126 EFFLUENT CELL (EAST END)	RLD-PMP-00032

10. FOR OPTIMAL PERFORMANCE, SUMP PUMPS IN ONE CELL ONLY SHOULD BE OPERATED AT A TIME.
11. LOCATE FLOOR DRAINS DIRECTLY BELOW SAFETY SHOWERS WHERE APPLICABLE.
12. ALL FLOOR DRAINS WILL HAVE PROVISION FOR SCREW IN PLUGS.
13. FULL PORT BALL VALVES REQUIRED.
14. CONTENTS OF THIS DOCUMENT ARE DANGEROUS WASTE PERMIT AFFECTING.
15. CONDENSATE LINES FROM PUMPING TRAPS TO TIE INTO TOP OF FLOOR DRAIN HEADER.
16. DELETED
17. DELETED
18. DELETED
19. PIPELINE SHALL BE TERMINATED 6 INCHES ABOVE SLAB GRADE. DRAIN HUB, DRAIN FIXTURES, AND DRAIN TERMINATION SHALL BE BY SUBCONTRACTOR.
20. DELETED
21. LINE SEGMENTED INTO TWO SECTIONS TO PERMIT DELINEATION OF DWP BOUNDARY IN CIS.
22. THE PORTIONS OF THIS DRAWING IN PHANTOM ARE CONSIDERED NON-PERMIT AFFECTING AND ARE NOT SUBJECT TO THE REGULATORY REQUIREMENTS OF THE WAC CODE FOR THE DANGEROUS WASTE PERMIT TO THE EXTENT THAT THOSE PORTIONS DO NOT IMPACT DANGEROUS WASTE AREAS/OPERATIONS.
23. MAJOR REVISION. EDITORIAL CHANGES TO OFFSHEET CONNECTOR TEXT. ADDED SLOPE SYMBOLS, RECONFIGURED ASX PIPING AND DRAIN, CHANGED SEVERAL DRAIN LINES TO NON-REGULATED STATUS, ADDED DRAIN LINES TO RLD-VSL-00004 HEADER, RENUMBERED RLD-FD-00109 TO RLD-FD-00185. DELETED 2 CONDENSATE DRAIN LINES.

HOLD/OPEN ITEMS:

1- 4. DELETED

STUART PAUL KRETZSCHMAR
STATE OF WASHINGTON
32345
REGISTERED
PROFESSIONAL ENGINEER
EXPIRES: 3/10/08

PLEASE NOTE THAT SOURCE, SPECIAL NUCLEAR AND BYPRODUCT MATERIALS, AS DEFINED IN THE ATOMIC ENERGY ACT OF 1954 (AEA), ARE REGULATED AT THE U.S. DEPARTMENT OF ENERGY (DOE) FACILITIES EXCLUSIVELY BY DOE ACTING PURSUANT TO ITS AEA AUTHORITY. DOE ASSERTS, THAT PURSUANT TO THE AEA, IT HAS SOLE AND EXCLUSIVE RESPONSIBILITY AND AUTHORITY TO REGULATE SOURCE, SPECIAL NUCLEAR, AND BYPRODUCT MATERIAL AT DOE-OWNED NUCLEAR FACILITIES. INFORMATION CONTAINED HEREIN ON RADIONUCLIDES IS PROVIDED FOR PROCESS DESCRIPTION PURPOSES ONLY.

REV	DESCRIPTION	ORG	CHKD	RVWD	APVD	DATE
2	REVISED PER NOTE 23, ISSUED FOR PERMITTING USE	PW	GK	RCS	MG	10/5/06
1	ISSUED FOR PERMITTING USE	PSH	EH	EI	KK	04/14/04
0	ISSUED FOR PERMITING USE	PAH	CJW	EI	EI	07/30/03

REVISION HISTORY

CM
QUALITY LEVEL

ISSUED BY RPP-WTP PDC
ISSUE STAMP

PROJECT No.	24590
SITE	HANFORD
AREA	200E
BUILDING No.	20

BECHTEL

RIVER PROTECTION PROJECT
WASTE TREATMENT PLANT
2435 STEVENS CENTER PLACE
RICHLAND, WA 99354

CONTRACT No: DE-AC27-01RV14136

	BY	DATE
ORIGINATOR	P.S. HOLGADO	07-24-03
CHECKER	E.M. HAN	07-24-03
APPROVER	C.S. WINKLER	07-30-03
REVIEWER	E. ISERN	07-25-03

P & ID - LAW RADIOACTIVE LIQUID WASTE DISPOSAL SYSTEM C3/C5 FLOOR DRAINS COLLECTION

CONTENT APPLICABLE TO ALARA? [X] YES [ ] NO
ADR NO. N/A REV:
SAFETY SCREEN REQUIRED? [ ] YES [X] NO E&NS INITIAL IF YES ____

SCALE: NONE
24590-LAW-M6-RLD-P0003
REV 2

SAFETY SCREEN IS REQUIRED FOR DRAWING TYPES IDENTIFIED IN 24590-WTP-GPP-SREG-002
2
'E' SIZE - 44x34
COMPUTER GENERATED - MANUAL CHANGES NOT PERMITTED

R10721934
10/03/2006 02:10:16 PM
PLOTTED BY: eewebb
C:\Work\dms05069\LAWM6RLDP0003R2.dgn

Permit Equivalency Notice

R10183485

ISSUED BY RPP-WTP PDC

PDC Number:	24590-WTP-PEN-ENV-03-003		
PEN Title:	Changes to the Permit P&IDs Referenced in LAW-010, Rev. 0.		
Date Prepared:	December 23, 2003	Originator:	S.C. Fahey

Source Document Driving Equivalency Determination (If Applicable)

Source Document Number	Rev	Source Document Name
24590-LAW-M6-LCP-00001	2	P&ID - LAW Concentrate Receipt Process System Concentrate Receipt Vessel LCP-VSL-00001
24590-LAW-M6N-LCP-00003	0	DCN for P&ID - LAW Concentrate Receipt Process System Concentrate Receipt Vessel LCP-VSL-00001
24590-LAW-M6-LCP-00002	2	P&ID - LAW Concentrate Receipt Process System Concentrate Receipt Vessel LCP-VSL-00002
24590-LAW-M6N-LCP-00003	0	DCN for P&ID - LAW Concentrate Receipt Process System Concentrate Receipt Vessel LCP-VSL-00002

Affected Permit Information

Permit Number:	WTP Final Dangerous Waste Permit WA7890008967	Revision:	12/03

Permit Equivalence Information

Specific Section(s)/Condition(s) Affected:

24590-LAW-M6-LCP-P0001 included in LAW-010 Revision 0 pursuant to III.10.E.9.c.ii

24590-LAW-M6-LCP-P0002 included in LAW-010 Revsion 0 pursuant to III.10.E.9.c.ii

Description of Substitution/Equivalence: (Attach supplemental information)

The following design changes have been made that affect the permit documents identified above. The changes are equivalent or better than the original design pursuant to Condition III.10.C.10.a.

24590-LAW-M6-LCP-00001

- Rerouted the LCP-BULGE-00002 drain line to the drain line of LCP-BULGE-00001.
- Rerouted the LCP-BULGE-00001 and LCP-BULGE-00002 drain lines to the RLD-SUMP-00029 from RLD-SUMP-030.
- Provided nozzle designation N06A to the thermowell (TE-0132) threaded connection.
- Provided a low point drain for maintenance of the LCP-BULGE-00002 and LCP-BULGE-00003 interconnecting piping.
- Added "LCP" to the title block.

24590-LAW-M6-LCP-00002

- Provided nozzle designation N06A to the thermowell (TE-0231) threaded connection.
- Added "LCP" to the title block.

WTP Environmental Permits Lead Approval

Signer: Bradley Erlandson — 12/29/03

Print/Type Name — *Signature* — *Date*

Attachment 51 – Appendix 9.4 Low Activity Waste Building General Arrangement Drawings

Where information regarding treatment, management, and disposal of the radioactive source, byproduct material, and/or special nuclear components of mixed waste (as defined by the Atomic Energy Act of 1954, as amended) has been incorporated into this permit, it is not incorporated for the purpose of regulating the radiation hazards of such components under the authority of this permit and chapter 70.105 RCW. In the event of any conflict between Permit Condition III.10.A. and any statement relating to the regulation of source, special nuclear, and byproduct material contained in portions of the permit application that are incorporated into this permit, Permit Condition III.10.A. will prevail.

Additional appendices will be added to this appendix as new information is incorporated into this permit.

Drawings and Documents

Attachment 51 – Appendix 9.4

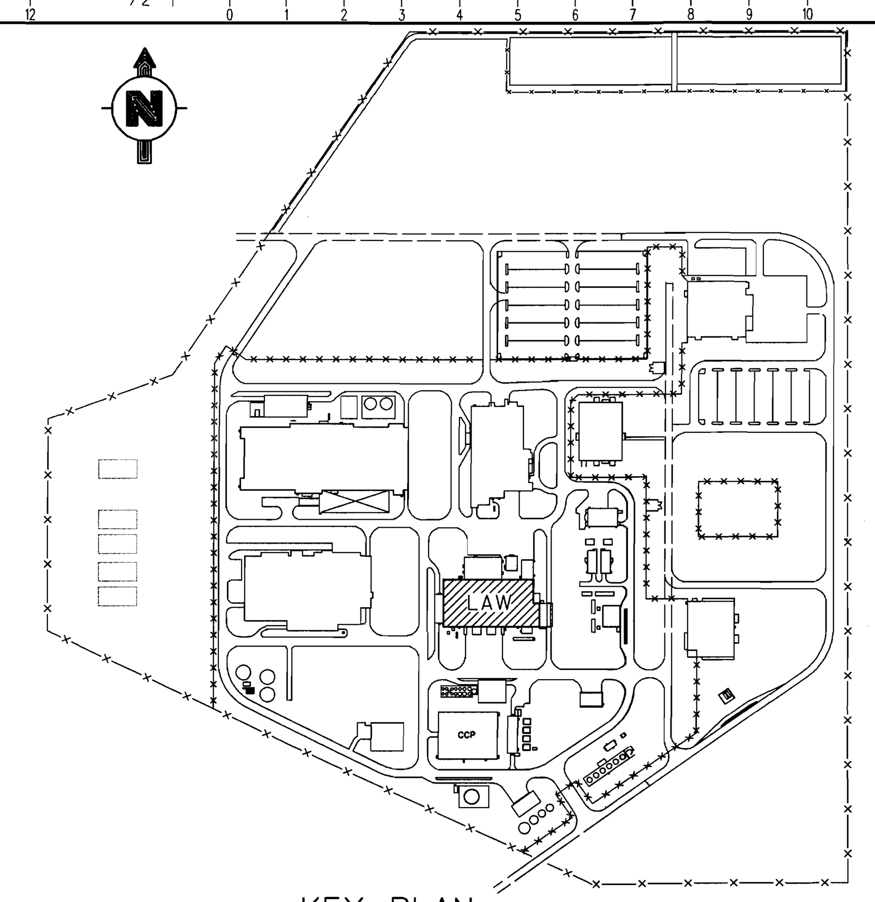
Low Activity Waste Building
General Arrangement Drawings

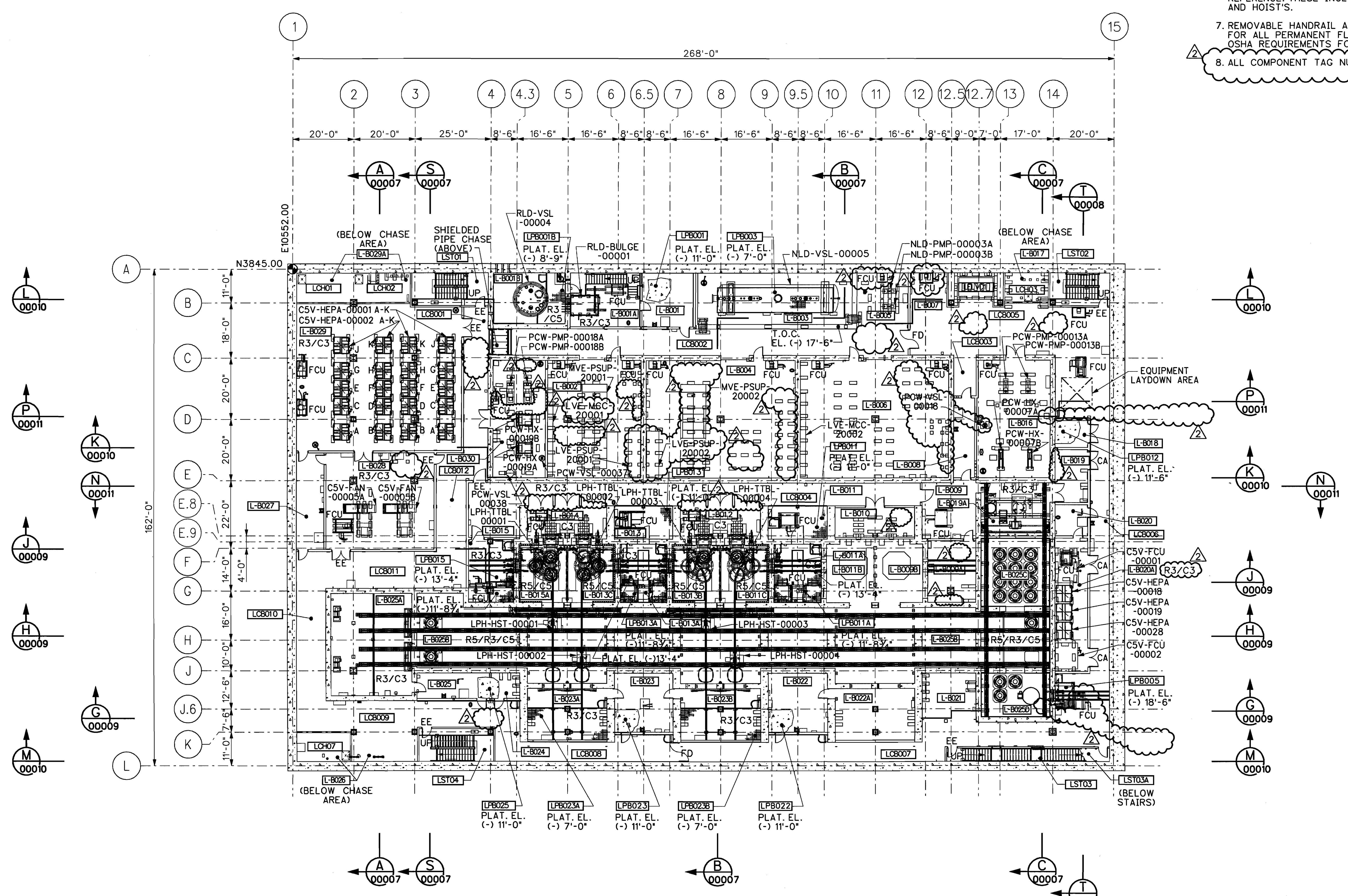
The following drawings have been incorporated into Appendix 9.4 and can be viewed at the Ecology Richland Office. **New drawings are in bold lettering**.

Drawing/Document Number	**Description**
24590-LAW-P1-P01T-00001, Rev 2	**General Arrangement Plan El. -21**
24590-LAW-P1-P01T-00002, Rev 5	**General Arrangement Plan El. 3**
24590-LAW-P1-P01T-00003, Rev 4	**General Arrangement Plan El. 22**
24590-LAW-P1-P01T-00004, Rev 3	**General Arrangement Plan El. 28**
24590-LAW-P1-P01T-00007, Rev 8	**General Arrangement Sections A-A, B-B, C-C**
24590-LAW-P1-P01T-00008, Rev 7	**General Arrangement Sections D-D, E-E, F-F, T-T**
24590-LAW-P1-P01T-00009, Rev 8	**General Arrangement Sections G-G, H-H, J-J**
24590-LAW-P1-P01T-00010, Rev 8	**General Arrangement Sections K-K, L-L, M-M, N-N**
24590-LAW-P1-P01T-00011, Rev 6	**General Arrangement Sections P-P, R-R, U-U**
RESERVED	RESERVED

GENERAL NOTES:

1. SEE PLOT PLAN DRAWING 24590-BOF-P1-50-00001 FOR ADDITIONAL NOTES AND REFERENCES.
2. ALL OPERATING AREAS ARE DESIGNATED R2/C2 UNLESS NOTED OTHERWISE.
3. THE LOWER RADIATION ZONE DESIGNATION ASSUMES CONTAINER IS NOT PRESENT.
4. ALL SUB-CHANGE ROOMS ARE CLASSIFIED R2/C2 AND FUNCTION AS AN ENTRYWAY INTO CONTAMINATED AREAS FROM C2 CORRIDORS.
5. REFER TO DRAWING 24590-LAW-P1-P01T-00007, SECTION "A", FOR CONVERSIONS FROM LAW FACILITY ELEVATIONS TO SITE ELEVATIONS. LAW FACILITY ELEVATION 0'-0" EQUALS SITE ELEVATION 678'-0" MSL.
6. ITEMS NOT NORMALLY INSTALLED ARE SHOWN IN PLACE FOR REFERENCE. THESE INCLUDE POUR CAVE AND REWORK MSM'S AND HOIST'S.
7. REMOVABLE HANDRAIL AND TOE PLATE TO BE FURNISHED BY CSA FOR ALL PERMANENT FLOOR HATCH OPENINGS IN ACCORDANCE WITH OSHA REQUIREMENTS FOR FALL PROTECTION.
8. ALL COMPONENT TAG NUMBERS ARE PREFIXED WITH "24590-LAW-".





PLAN AT EL (-)21'-0"

NOTES:

1. REFER TO DRAWING 24590-LAW-P1-P23T-01000 AND 01001 FOR EQUIPMENT IDENTIFICATION NUMBERS AND ROOM SCHEDULE.
2. CONTENTS OF THIS DOCUMENT ARE DANGEROUS WASTE PERMIT AFFECTING.
3. REVISED TO INCORPORATE THE FOLLOWING:

24590-LAW-DCA-M-02-009, REV. 0	2+2 MELTER CONFIGURATION, PART 1
24590-LAW-DCA-HV-02-001, REV. 0	AIR-INBLEED SYSTEM DESIGN REVISION
24590-LAW-DCA-M-03-007, REV. 0	P & ID - LAW HVAC CHILLED WATER SYSTEM DISTRIBUTION CHANGES
24590-LAW-DCN-HV-02-001, REV. 0	INCLUDE DAMPERED BYPASS DUCTS ON EXAUST DUCTWORK FROM INBLEED FILTER HOUSINGS
24590-LAW-DCN-IN-02-001, REV. 0	CHANGES IN THE CONTROL SYSTEM ARCHITECTURE
24590-LAW-DCN-IN-02-002, REV. 0	EL. (-) 21'-0" ADDITIONAL INSTRUMENT RACKS
24590-LAW-DCN-IN-02-003, REV. 1	EL. (-) 21'-0" INSTRUMENT RACKS, PC/VIDEO EQUIPMENT ENCLOSURES, LOI'S, RJP INSTRUMENTS & EMJ JUNCTION BOX CHANGES
24590-LAW-DCN-PL-01-001, REV. 0	STRUCTURAL MODIFICATIONS
24590-LAW-P1N-P01T-00004	GENERAL DRAWING REVISIONS
24590-LAW-P1N-P01T-00003	ROOM NUMBER CHANGES
24590-LAW-P1N-P01T-00010	REV'D TO MAKE 24590-WTP-FCR-M-03-003 UNNECCESSARY
24590-LAW-P1N-P01T-00018	EQUIP. CHANGE, RAD DESIGNATION
24590-LAW-P1N-P01T-00019	RESTRICT MAINT. ACCESS, EQUIP. REMOVAL, FIX NOTE 4
24590-WTP-FCR-M-03-003	DESIGN CONFLICT
TN 24590-03-01161	ELIMINATE TWO LAW TRANSFORMERS
TN 24590-02-00706	2+2 MELTER OPTION
TN-24590-03-00850	MELTER POWER SUPPLY & BUS REDESIGN

ADDED GENERAL NOTE 8, ADDED R3/C3 DESIGNATION TO ROOM L-B020A, REMOVED ROOM SCHEDULE SEE NOTE 1, DELETED PCW-EVAP-00004, AND PCW-VSL-00039, DELETED HOLD 1, DELETED CALLOUT FOR LPH-TTBL-00007.

LEGEND:

CA	CONTROLLED ACCESS
EE	EMERGENCY EXIT
FCU	FAN COIL UNIT
FD	FIRE DOOR
MSL	MEAN SEA LEVEL
T.O.C.	TOP OF CONCRETE
L-BXXX	ROOM, CELL, (VAULT) OR TUNNEL
LCBXXX	CORRIDOR OR CONNECTING VESTIBULE
LMBXXX	MEZZANINE
LPBXXX	ROOM PLATFORM
LPCBXXX	CORRIDOR PLATFORM
LCHXX	CHASE
LSTXX	STAIR
LELVXX	ELEVATOR
	SUMP
	EQUIPMENT LAYDOWN AREA
	CONCRETE
	CHECKERED PLATE
	GRATING
	EMERGENCY EYEWASH
	LADDER
	LADDER W/CAGE
	CHASE ACCESS CEILING PANEL
	EMERGENCY SHOWER/EYEWASH

HOLDS:

1. DELETED

REV	DESCRIPTION	ORG	CHKD	RVWD	APVD	DATE
2	INCORPORATED CHANGES IDENTIFIED IN NOTE 3	CMS	PR			2/8/05
1	ISSUED FOR DESIGN AND REVISED PER DESIGN CHANGES IDENTIFIED IN NOTE 3	CMS	AH	RM	CW	06-02-03
0	ISSUED FOR CONSTRUCTION-SUPERSEDES DWG-W375LV-PL000042, REV D	AH	RM	N/A	SF	09-17-01

REVISION HISTORY

ISSUED BY RPP-WTP PDC

ISSUE STAMP

PROJECT No.	24590
SITE	HANFORD
AREA	200E
BUILDING No.	20

	BY	DATE
ORIGINATOR	HARSHFIELD, ALAN	09-17-01
CHECKER	MOSSBRUCKER, ROBERT	09-17-01
APPROVER	FOELBER, STEVEN	09-17-01
REVIEWER	N/A	N/A

CONTENT APPLICABLE TO ALARA? [X] YES [ ] NO
ADR NO. 24590-LAW-ADR-PL-02-003 REV: 1

RIVER PROTECTION PROJECT
WASTE TREATMENT PLANT
2435 STEVENS CENTER PLACE
RICHLAND, WA 99352

CONTRACT No: DE-AC27-01RV14136

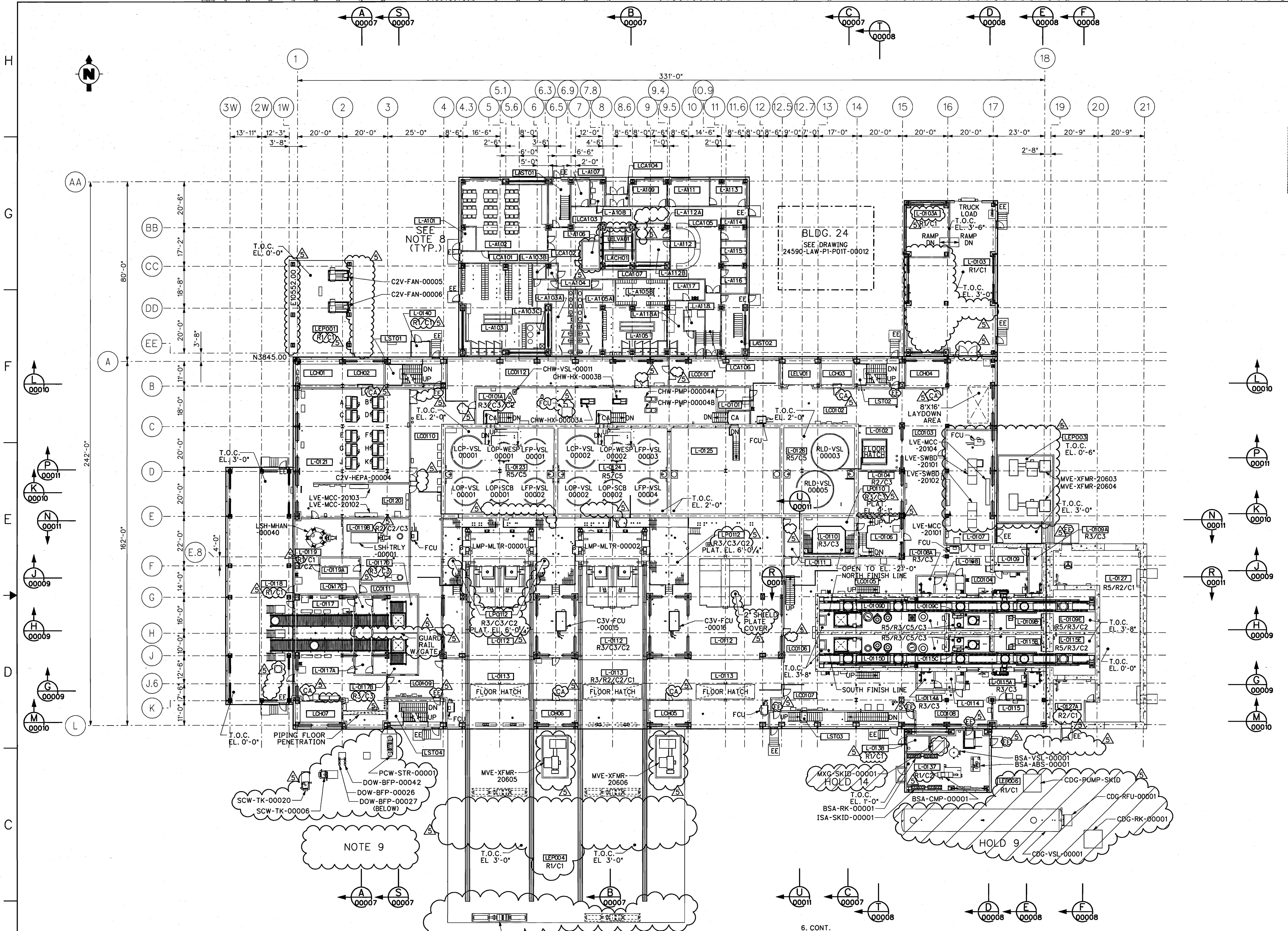
LAW VITRIFICATION BUILDING GENERAL ARRANGEMENT PLAN AT EL. (-)21'-0"

SCALE: 1/16"=1'-0"

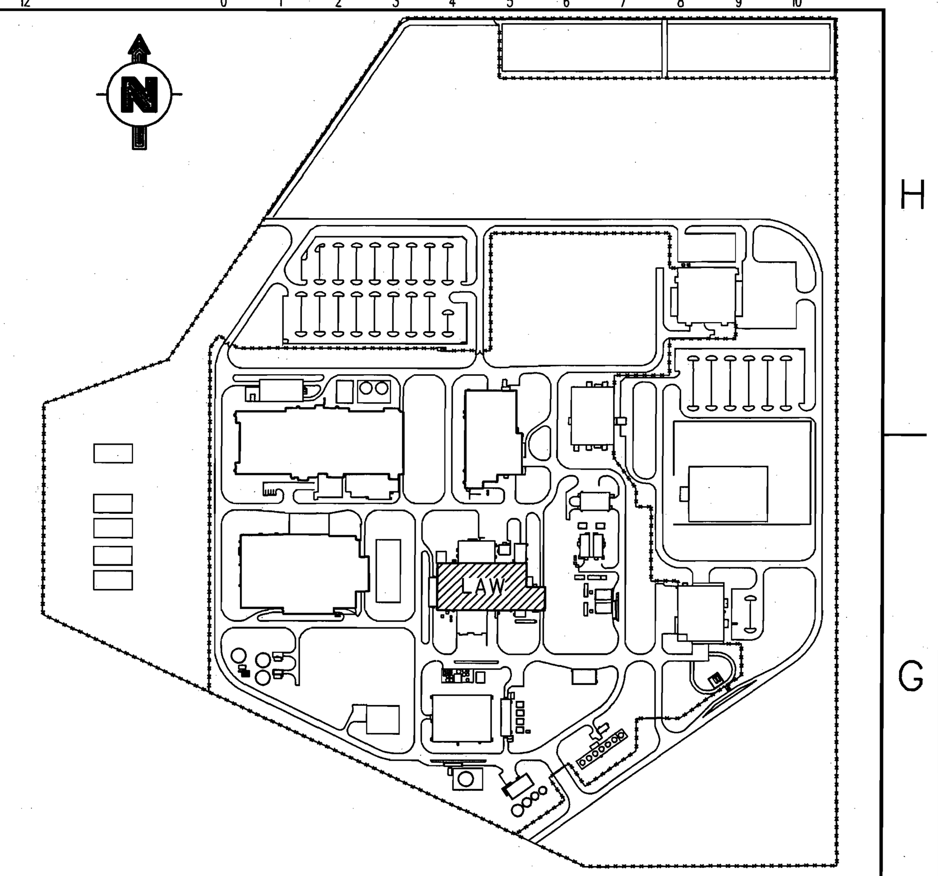
24590-LAW-P1-P01T-00001 REV 2

'E' SIZE - 44x34

PLOTTED BY: arfuller
Work\dms06392\24590LAWP1P01T00001.DGN



PLAN AT EL 3'-0"



KEY PLAN
NTS

LEGEND:

CA	CONTROLLED ACCESS
EE	EMERGENCY EXIT
FD	FIRE DOOR
MSL	MEAN SEA LEVEL
T.O.C.	TOP OF CONCRETE
L-XXXX	ROOM, CELL, (VAULT) OR TUNNEL
LCXXXX	CORRIDOR OR CONNECTING VESTIBULE
LMXXXX	MEZZANINE
LPXXXX	ROOM PLATFORM
LPCXXXX	CORRIDOR PLATFORM
LCHXX	CHASE
L-AXXX	ANNEX ROOM
LSTXX	STAIR
LELVXX	ELEVATOR
LEPXXX	EQUIPMENT PAD
⊗	SUMP
	EQUIPMENT LAYDOWN AREA
	CONCRETE
	CHECKERED PLATE
	GRATING
⊙	EMERGENCY EYEWASH
	LADDER
	CHASE ACCESS CEILING PANEL
	EMERGENCY SHOWER/EYEWASH
	FLOOR PENETRATION

HOLDS:

1. DELETED.
2. DELETED.
3. DELETED.
4. DELETED.
5. DELETED.
6. DELETED.
7. DELETED.
8. DELETED.
9. CDG-VSL-00001, CDG-RFU-00001, CDG-RK-00001, AND CDG-PUMP-SKID LOCATION PENDING VENDOR DATA.
10. DELETED
11. DELETED
12. DELETED
13. DELETED.
14. MXG-SKID-00001 PENDING MECHANICAL SYSTEMS DESIGN INPUT.

NOTES:

1. FOR GENERAL NOTES, SEE 24590-LAW-P1-P01T-00001.
2. CONTENTS OF THIS DOCUMENT ARE DANGEROUS WASTE PERMIT AFFECTING.
3. REFER TO DWG. 24590-LAW-P1-P01T-00003 22'-0" PLAN FOR ITEMS BELOW 28'-0" LEVEL AND NOT INDICATED ON THIS DRAWING.
4. REFER TO DRAWING 24590-LAW-P1-P23T-01002 AND 01003 FOR EQUIPMENT IDENTIFICATION NUMBERS.
5. REVISED PER:

24590-LAW-DCA-M-02-009,REV.0	2+2 MELTER CONFIGURATION, PART 1
24590-LAW-DCA-M-02-006,REV.0	ELIMINATION OF CONTAINER STORAGE FACILITY
24590-LAW-DCA-M-02-010,REV.0	ACCUMULATIVE CHANGES TO LAW MHD'S
24590-LAW-DCA-HV-02-001,REV.0	AIR-INBLEED SYSTEM DESIGN REVISION
24590-LAW-DCA-PL-02-001,REV.0	IMPROVED ACCESS TO THE PROCESS CELLS
24590-LAW-DCA-PR-03-002,REV.0	CDG INSTRUMENTATION AND MISCELLANEOUS CHANGES
24590-LAW-DCA-PR-02-001,REV.0	MODIFICATION OF THE PROCESS EQUIPMENT IN THE LAW CANISTER DECONTAMINATION SYSTEM
24590-LAW-DCN-HV-02-001,REV.0	INCLUDE DAMPERED BYPASS DUCTS ON EXHAUST DUCTWORK FROM INBLEED FILTER HOUSINGS
24590-LAW-DCN-PR-02-001,REV.0	SPLIT LFH/LAW CONTAINER FINISHING HANDLING INTO TWO SYSTEMS
24590-LAW-DCA-PR-02-004,REV.0	DELETION OF CDG COMPRESSED AIR EQUIPMENT
24590-LAW-P1N-P01T-00005	GENERAL DRAWING REVISIONS
24590-LAW-P1N-P01T-00001	REVISE LST03 EAST WALL LOCATION.
24590-LAW-P1N-P01T-00002	RELOCATE CO2 DECONTAMINATION EXHAUST EQUIPMENT.
24590-LAW-P1N-P01T-00007	REMOVE MELTER ANNULUS COOLING SYSTEM.
24590-LAW-P1N-P01T-00012	REVISE SUB-CHANGE ROOFS, CONSUMABLE IMPORT LAYOUT, DELETE UREA AREA, ADDED BREATHING AIR STRUCTURE.
24590-LAW-P1N-P01T-00015	REMOVE AUXILIARY UTILITY ENCLOSURE ROOM L-0139.

6. REVISED PER
REDUCED WALL HEIGHT SEPARATING L-0117C/L-0117D AND L-0117A/L-0117B TO MEET HVAC REQUIREMENTS. SET WALL HEIGHT AT 36" HIGH FOR MAINTENANCE SAFETY BARRIER WITH OPEN FLOOR HATCHES

ROLL UP DOORS TO 13' HIGH (L-0119 AND L-0119B) AND ALIGNED LOCATION.

RADIATION/CONTAMINATION CLASSIFICATIONS FOR ROOM L-0101A FROM R3/C3 TO R3/C2.

CORRECTED MELTER RAIL LENGTH PER ISSUED DPD 24590-LAW-M0-LMH-00002001 REV. 0

RELOCATED MELTER AIRLOCK DOORS AND WALL TO SOUTH SIDE OF COLUMNS J

RELOCATED MELTER AIRLOCK DOORS TO SOUTH SIDE OF COLUMN L.

RELOCATED C3V-FCU-00015 AND C3V-FCU-00016 FROM PLATFORM TO EL. 3'-0"

REVISED FINISH LINE EQUIPMENT TO SUPPORT PRESS FIT LID DESIGN.

ADDED CHASE ACCESS DOORS TO LCH02, LCH03, LCH05, LCH06 AND LCH07.
CONSUMABLE IMPORT/EXPORT CARTS LSH-MHAN-00040 (L-0119) AND LSH-TRLY-00001 (L-0119B).
HOLD NOTE 11
DELETED:
PCW-COND-00004 AND ASSOCIATED EQUIPMENT FROM ROOM L-0105.
MVE-XFMR-20601 AND MVE-XFMR-20602 PER TREND TN-24590-03-01161
REVISED TO RELEASE HOLD 1,2,3,6,8, RENAMED FCU C3V-FCU-00016
REVISED LAYOUT OF ANNEX FIRST FLOOR ROTATED TURNTABLE PER VENDOR SUBMITTAL ADDED HOLD 12, ADDED NOTE 7, ELECTRICAL BUILDING MOVED TO DGN. 24590-LAW-P1-P01T-00012, LOCATED AND ADDED CALL OUTS FOR FCU'S, REVISED ANNEX COLUMN GRID, ROTATED CDG-VSL-00001 AND CDG-RFU-00001, RENAMED BSA-ABS-00001.

6. CONT.

INCORPORATED DCN 24590-LAW-P1N-P01T-00022, 24590-LAW-P1N-P01T-00023, 24590-LAW-P1N-P01T-00028, AND 24590-LAW-P1N-P01T-00029
RELEASED HOLDS 10, 11, AND 12, ADDED CONTAINER INSPECTION PLATFORMS, MELTER ASSEMBLY PAD, IMPORT AND EXPORT GRAPPLE STANDS, SPARE EXPORT GRAPPLE, AND MELTER INSTALLATION/REMOVAL EQUIPMENT, MODIFIED IMPORT CONVEYORS TO VENDOR DESIGN, DELETED NOTE 7, ADDED NOTE 8, PARTITION WALL REVISION PER ARCHITECTURAL DETAILS, REMOVED TRANSFORMER FIRE SEPARATION BARRIER WALLS, REVISED FINISH LINE LIDDING EQUIPMENT, RELOCATED LIDDING EQUIPMENT CONTROL PANELS TO 28'-0" LEVEL, REVISED LVE-SWBD-20101, AND LVE-SWBD-20102.

RELEASED HOLD 13, REVISED MVE-XFMR-20603, MVE-XFMR-20604, MVE-XFMR-20605, AND MVE-XFMR-20606 PER VENDOR SUBMITTALS, REMOVED CHAIN LINK FENCE SEPARATING L-0103A, L-0103B, L-0103C, AND L-0103D, DELETED ROOM NUMBER LABELS L-0103A/B/C, RELABELED L-0103D TO L-0103A, REVISED CONCRETE SLAB AND ADDED SUPPORT FRAME FOR LEP001, ADDED CDG-RK-00001, CDG-PUMP-SKID, SCW-TK-00020, DOW-BFP-00026, DOW-BFP-00027, AND DOW-BFP-00042, REVISED ORIENTATION OF PCW-STR-00001, REVISED EQUIPMENT SUPPORT PADS SOUTH OF COLUMN LINE L AND WEST OF COLUMN LINE 4 TO MATCH REVISED EQUIPMENT, REVISED AND ADDED RADIOLOGICAL AND CONTAMINATION CLASSES TO LEP001, LEP004, LP0110, LP0112, L-0101A, L-0117B, L-0117D, L-0118, L-0119, L-0127A, L-0137, L-0138, AND L-0140, ADDED C3V-FCU-00038 TO L-0101A, REVISED HOLD NOTE 9, DELETED ERRONEOUS ROOM CALL OUT L-A110 AT COL. BB/2, ADDED CALL OUT LMH-MHAN-00079 AND SCW-TK-00006, REVISED MELTER ASSEMBLY PAD AT COL. L/4 TO L/9.5 AND ADDED LABEL LEP004, REMOVED FIRE DOOR (FD) CALL OUT IN LC0101, ADDED CALL OUT FOR 2" SHIELD PLATE COVER IN L-0112, INCORPORATED DCN 24590-LAW-P1N-P01T-00031, RELOCATED GRAPPLE STAND IN L-0118, REVISED WALLS FOR L-A106 AND LELVA01, REPLACED ROLL UP DOOR AT COL. A/16-17 WITH DOUBLE SWING DOOR, REMOVED EMERGENCY EXIT (EE) LABELS FROM INTERIOR DOORS, ADDED EMERGENCY EXIT (EE) LABELS TO ADDITIONAL EXTERIOR DOORS, ADDED CONTROLLED ACCESS (CA) LABELS TO ALL CHASE ACCESS DOORS, REVISED WALL AND DOOR AT COL. E/15, REVISED NOTE 4 AND 8, ADDED NOTE 9 AND HOLD 14, AND REVISED ADR REVISION.

7. DELETED
8. ALL ANNEX ROOMS (L-A***) ARE DESIGNATED R1/C1.
9. REFER TO 24590-BOF-P1-50-00002 FOR CHILLED WATER BOOSTER PUMP LOCATION.

REV	DESCRIPTION	ORG	CHKD	RVWD	APVD	DATE
5	REVISED TO INCORPORATE CHANGES IN NOTE 6	TH	CMS	JMc		4/3/07
4	REVISED TO INCORPORATE CHANGES IN NOTE 6	DLL	CMS	PR	DRJ	12/19/05
3	REVISED TO INCORPORATE CHANGES IN NOTE 6	DLL	CMS	PR	KK	2/8/05
0	ISSUED FOR DESIGN-SUPERSEDES DWG-W375LV-PL00043, REV D	AH	RM	N/A	GD	07-03-02

REVISION HISTORY

ISSUED BY RPP-WTP PDC
ISSUE STAMP

PROJECT No.	24590
SITE	HANFORD
AREA	200E
BUILDING No.	20

BECHTEL
RIVER PROTECTION PROJECT
WASTE TREATMENT PLANT
2435 STEVENS CENTER PLACE
RICHLAND, WA 99354

CONTRACT No: DE-AC27-01RV14136

	BY	DATE
ORIGINATOR	HARSHFIELD, ALAN	07-03-02
CHECKER	MOSSBRUCKER, ROBERT	07-03-02
APPROVER	DUNCAN, GARTH	07-03-02
REVIEWER	N/A	N/A

CONTENT APPLICABLE TO ALARA? [X] YES [ ] NO
ADR NO. 24590-LAW-ADR-PL-02-002 REV: 1
SAFETY SCREEN REQUIRED? [X] YES [ ] NO E&NS INITIAL IF YES DEK

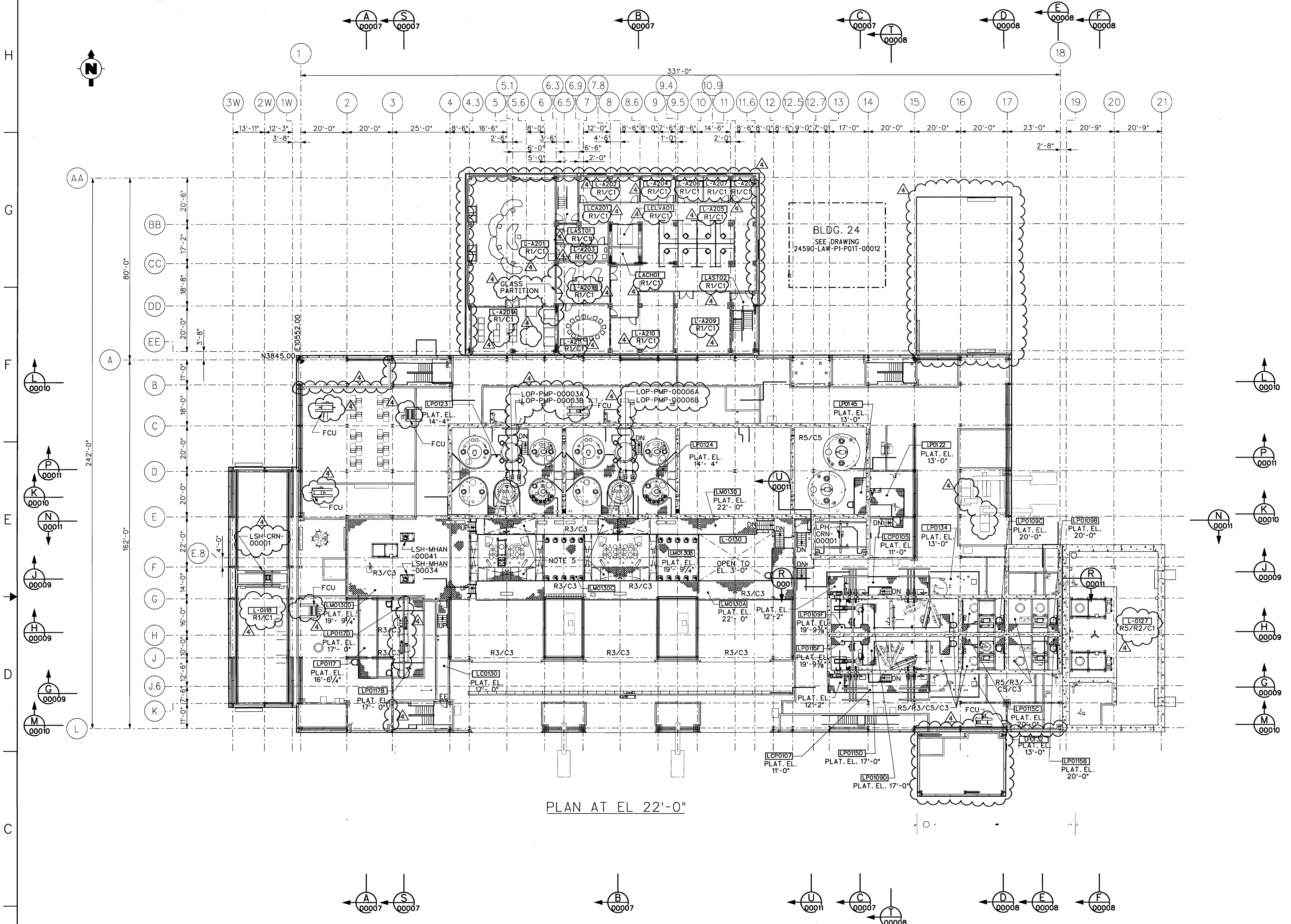
LAW VITRIFICATION BUILDING GENERAL ARRANGEMENT PLAN AT EL. 3'-0"

SCALE: 1/16"=1'-0"

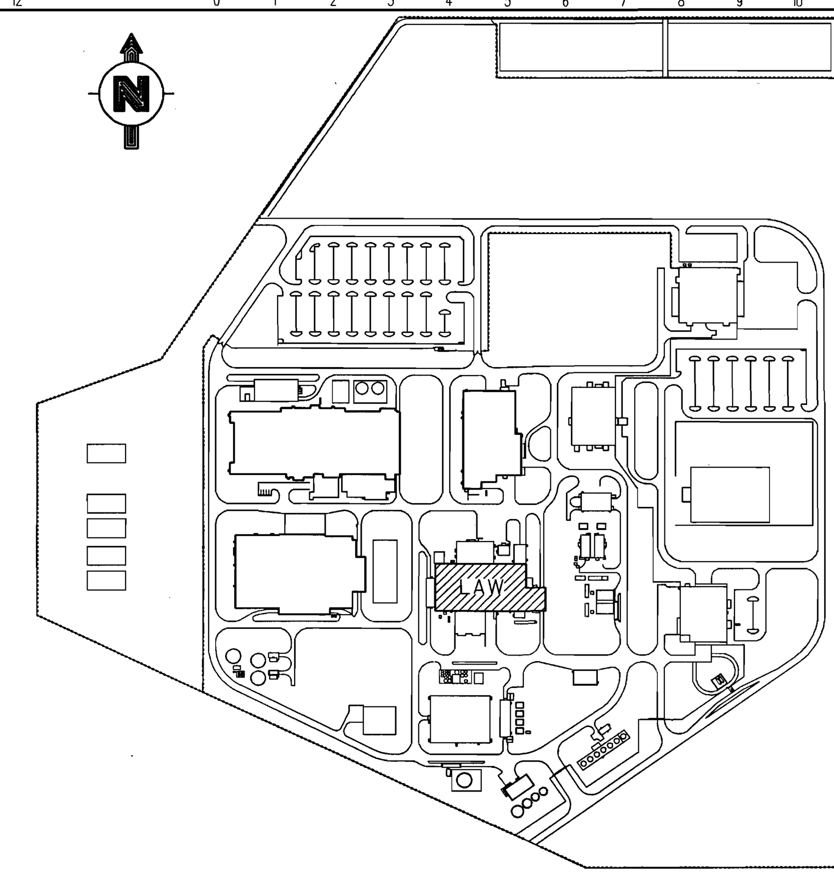
24590-LAW-P1-P01T-00002 REV 5

'F' SIZE - 44x34

PLOTTED BY: tehawkin
Work\dms06392\24590LAWP1P01T00002.DGN



PLAN AT EL 22'-0"



KEY PLAN
NTS

HOLDS:

1. DELETED
2. DELETED
3. DELETED
4. DELETED
5. DELETED
6. DELETED
7. DELETED
8. DELETED
9. DELETED
10. DELETED

LEGEND:

FCU	FAN COIL UNIT
LCXXXX	CORRIDOR OR CONNECTING VESTIBULE
LMXXXX	MEZZANINE
LPXXXX	ROOM PLATFORM
LCPXXXX	CORRIDOR PLATFORM
L-AXXX	ANNEX
LCAXXX	ANNEX CORRIDOR
LASTXX	ANNEX STAIR
	CONCRETE
	CHECKERED PLATE
	GRATING
	LADDER
	LADDER W/CAGE

NOTES:

1. FOR GENERAL NOTES, SEE 24590-LAW-P1-P01T-00001.
2. CONTENTS OF THIS DOCUMENT ARE DANGEROUS WASTE PERMIT AFFECTING.
3. REFER TO DWG. 24590-LAW-P1-P01T-00003 3'-0" PLAN FOR ITEMS BELOW 28'-0" LEVEL AND NOT INDICATED ON THIS DRAWING.
4. REVISED TO INCORPORATE THE FOLLOWING:

24590-LAW-DCA-M-02-009,REV.0	2+2 MELTER CONFIGURATION, PART 1
24590-LAW-DCA-M-02-006,REV.0	ELIMINATION OF CONTAINER STORAGE FACILITY
24590-LAW-DCA-M-02-010,REV.0	ACCUMULATIVE CHANGES TO LAW MHD'S
24590-LAW-DCA-HV-02-001,REV.0	IMPROVED ACCESS TO THE PROCESS CELLS
24590-LAW-DCA-PL-02-001,REV.0	CDG INSTRUMENTATION AND MISCELLANEOUS CHANGES
24590-LAW-DCA-PR-03-002,REV.0	CDG INSTRUMENTATION AND MISCELLANEOUS CHANGES
24590-LAW-DCA-PR-02-001,REV.0	MODIFICATION OF THE PROCESS EQUIPMENT IN THE LAW CANISTER DECONTAMINATION SYSTEM
24590-LAW-DCA-PR-02-004,REV.0	DELETION OF CDG COMPRESSED AIR EQUIPMENT
24590-LAW-DCA-PR-03-004,REV.0	ADDITION OF TWO ANHYDROUS AMMONIA TANKS
24590-LAW-P1N-P01T-00005	GENERAL DRAWING REVISIONS
24590-LAW-P1N-P01T-00006	RELOCATION OF CONTAINER DECONTAMINATION EXHAUST FAN
24590-LAW-P1N-P01T-00011	REVISED LST03 EAST WALL LOCATION
24590-LAW-P1N-P01T-00012	REVISED SUB-CHANGE ROOF LAYOUT
24590-LAW-P1N-P01T-00017	DELETE EQUIPMENT PLATFORMS LP0130B, LP0130C AND LP0130D

UPDATED FINISH LINE EQUIPMENT PER CONTAINER LIDDING EQUIPMENT UPDATES AND REVISED SYSTEM LFH DESIGN INPUTS

ADDED BREATHING AIR SYSTEM STRUCTURE

RELOCATED COLUMN "J" MELTER AIRLOCK DOORS AND WALL SOUTH OF COLUMN "J"

RELOCATED COLUMN "L" MELTER ROLL-UP DOORS TO BE SURFACE MOUNTED ON BUILDING EXTERIOR.

RELEASED HOLDS 1,2,3,5, AND 6. ANNEX COLUMN LINES, REVISED ACCESS PLATFORM LP0145, ADDED NOTE 6, REVISED PLATFORM ELEVATIONS LP0109F,LP0115F, LP0117.

4 RELEASED HOLDS 9 AND 10, DELETED NOTE 6, ADDED ROOM CALLOUTS AND RAD CLASSES FOR L-0118 AND L-0127, ADDED RAD CLASSIFICATIONS FOR R1/C1 ROOMS, ROTATED PUMPS LOP-PMP-00003A, 3B, 6A, AND 6B, REVISED ROOM L-A212 TO L-A201B, UPDATED FCU'S.

5. REMOVABLE DECK PLATE PROVIDES ACCESS FOR INSPECTION AND REMOVAL OF MELTER OFFGAS SPOOLS, MELTER FEED LINES AND MELTER DISCHARGE HEATERS. DO NOT PERMANENTLY INSTALL ANY EQUIPMENT IN THESE AREAS.

4 6. DELETED

REVISION HISTORY

REV	DESCRIPTION	ORG	CHKD	RVWD	APVD	DATE
4	REVISED TO INCORPORATE CHANGES IN NOTE 4	[signature]	CMS	PR	[signature]	12/19/05
3	REVISED TO INCORPORATE CHANGES IN NOTE 4	DLL	CMS	PR	KK	2-8-05
0	ISSUED FOR DESIGN-SUPERSEDES DWG-W375LV-PL00044, REV D	MG	RM	CJW	MM	11-13-02

ISSUED BY RPP-WTP PDC
ISSUE STAMP

PROJECT No.	24590
SITE	HANFORD
AREA	200E
BUILDING No.	20

BECHTEL
RIVER PROTECTION PROJECT
WASTE TREATMENT PLANT
2435 STEVENS CENTER PLACE
RICHLAND, WA 99354

CONTRACT No: DE-AC27-01RV14136

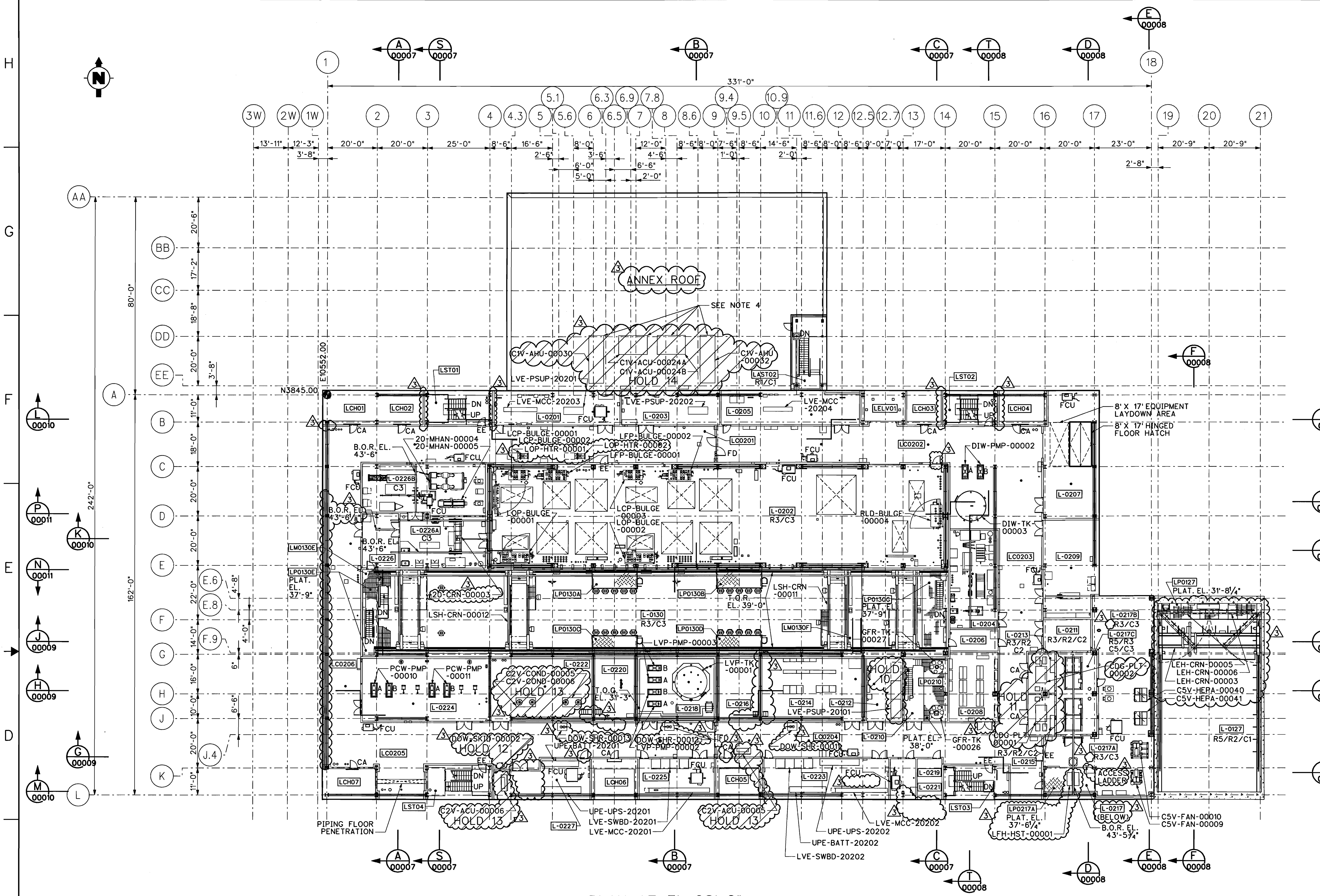
	BY	DATE
ORIGINATOR	GRIFFIS, MARK	10-16-02
CHECKER	MOSSBRUCKER, ROBERT	10-16-02
APPROVER	MYATT, MARK	10-16-02
REVIEWER	WINKLER, CLIFFORD	11-13-02

LAW VITRIFICATION BUILDING GENERAL ARRANGEMENT PLAN AT EL. 22'-0"

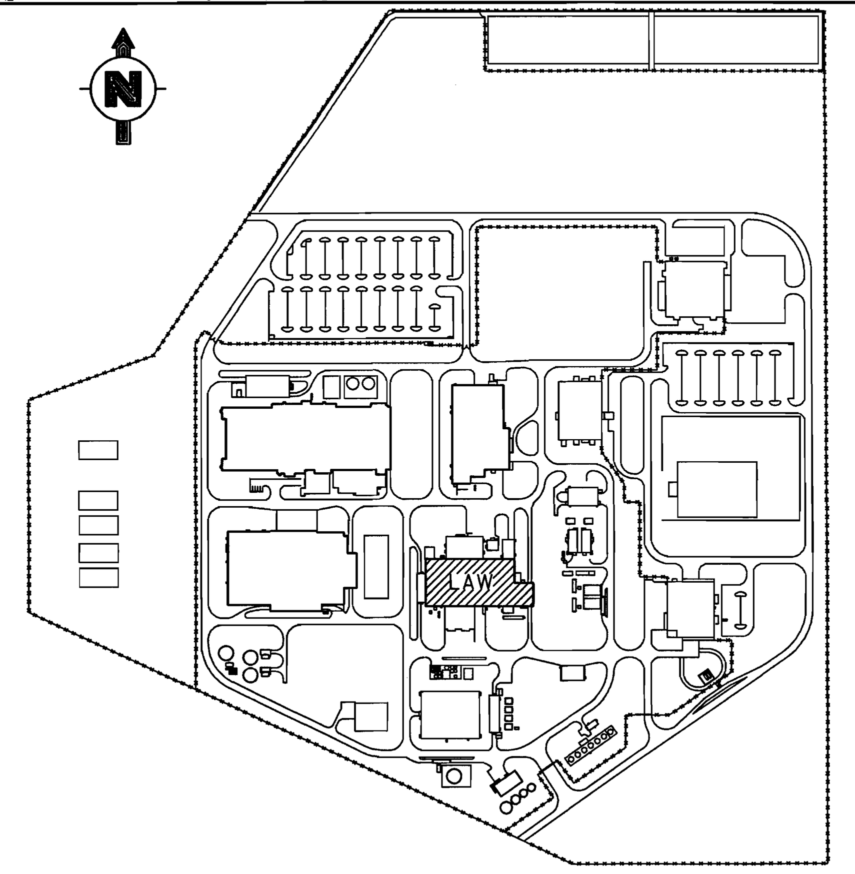
CONTENT APPLICABLE TO ALARA? [X] YES [ ] NO
~~ADR NO. 24590-LAW-ADR-PL-03-005 REV: 0~~
4 SAFETY SCREEN REQUIRED? [X] YES [ ] NO E&NS INITIAL IF YES DEK

SCALE: 1/16"=1'-0"
24590-LAW-P1-P01T-00003
REV 4

ED BY: arfuller
rk\dms06392\24590LAWP1P01T00003.DGN



PLAN AT EL 28'-0"



KEY PLAN
NTS

LEGEND:

- CA — CONTROLLED ACCESS
- EE — EMERGENCY EXIT
- FCU — FAN COIL UNIT
- FD — FIRE DOOR
- L-XXXX — ROOM, CELL, (VAULT) OR TUNNEL
- LCXXXX — CORRIDOR OR CONNECTING VESTIBULE
- LMXXXX — MEZZANINE
- LPXXXX — ROOM PLATFORM
- LPCXXXX — CORRIDOR PLATFORM
- LCHXX — CHASE
- LELVXX — ELEVATOR
- LSTXX — STAIR
- LASTXX — ANNEX STAIR
- EQUIPMENT LAYDOWN AREA
- CONCRETE
- CHECKERED PLATE
- GRATING
- EMERGENCY EYEWASH
- LADDER
- EMERGENCY SHOWER/EYEWASH
- FLOOR PENETRATION

HOLDS:

1. DELETED
2. DELETED
3. DELETED
4. DELETED
5. DELETED
6. DELETED
7. DELETED
8. DELETED
9. DELETED
10. MELTER START-UP HEATER POWER SUPPLIES PENDING ELECTRICAL INPUT.
11. CDG SYSTEM PENDING MECHANICAL SYSTEMS INPUT.
12. TEMPERED WATER SYSTEM PENDING VENDOR SELECTION TO BE PROVIDED BY MECHANICAL SYSTEMS.
13. ALL ACUS AND CONDENSERS PENDING VENDOR SELECTION AND INPUT TO BE PROVIDED BY HVAC ENGINEERING.
14. ANNEX ROOF EQUIPMENT PENDING FINAL LOCATION.

NOTES:

1. FOR GENERAL NOTES, SEE 24590-LAW-P1-P01T-00001
2. CONTENTS OF THIS DOCUMENT ARE DANGEROUS WASTE PERMIT AFFECTING.
3. REVISIONS:

24590-LAW-P1N-P01T-00008 RELOCATE DECON EXHAUST EQUIP TO EL. 28'-0"

24590-LAW-P1N-P01T-00011 REMOVE FIXATIVE EQUIP AND CONC WALLS,

24590-LAW-P1N-P01T-00013 REVISE LST03 WALLS AND L-0217 DOOR

24590-LAW-P1N-P01T-00014 REVISE PARTITION WALL AT COL G/2 TO COL G/14

24590-LAW-P1N-P01T-00016 DELETE PARTITION WALL AT COL H/4
DELETE PARTITION WALL AT COL H/6
REVISE CHASE WALL LOCATIONS ADD DOORS
REVISE DOOR LOCATION AT COL C/7
RELOCATE POWER SUPPLIES TO L-0212
REVISE CCB SUPPORTS AND PLATFORMS
DELETE WALL BETWEEN LCH01 & LCH02
DELETE FIXATIVE CABINETS
REVISE LELV01 ENTRANCE DOOR
REVISE DOUBLE DOOR LOCATIONS COL J & K
RELOCATE EYEWASH TO L-0204
REVISE PARTITION WALLS TO CLEAR COLUMN
ALL EL. 28'-0" (NOT CLOUDED FOR CLARITY)
REVISE C3 WORKSHOP LAYOUT
REMOVE/REVISE L-0217C CONCRETE WALLS
MOVE EAST WALL OF LCH04
RELOCATE MISC FAN COIL UNITS TO FLOOR
ADD CONDENSING UNITS
ADD AIR CONDENSING UNITS
REVISED INERT FILL BINS AND PLATFORM
REVISE CAUSTIC BLOW DOWN TANK SYSTEM
REVISE L-0218 WALLS AND DOORS
REVISE DIW PUMP SIZED/REMOVE ONE PUMP
REVISE LST04 WEST WALL
RELOCATE LFH GRAPPLE STAND

3. CONT.

REVISED L-0213 AND L-0215 LAYOUT AND REMOVED NORTH AND SOUTH ACCESS DOORS.

ADDED C2 WORKSHOP AND C2 MSM MAINTENANCE SHOP EQUIPMENT TO L-0204 AND L-0209 RESPECTIVELY

REVISED HATCH AND LAYDOWN AREA IN L-0207 PER STRUCTURAL INPUT.

REVISED ROLL-UP DOOR LOCATION AT COL C/12.7

DELETED ROOM SCHEDULE. REFER TO ARCHITECTURAL ROOM SCHEDULE (24590-LAW-A5-A19T-05203-001)

REVISED DOW-HTR-00003

REVISED BULGES IN L-0202

REVISED FCU LOCATION IN L-0202

REVISED LSH-CRN-00011 AND LSH-CRN-00012 PER VENDOR DESIGN INPUTS

REVISED DOOR LOCATION TO L-0205

REVISED SECTION "D" LOCATION FOR CLARITY

REVISED NOTE 2

DELETED HOLD NOTES 4 AND 5

DELETED LVE-MCC-20205 AND LVE-MCC-20206

ADDED HOLD NOTES 7, 8 AND 9

RETAGGED LVP-VSL-00001 TO LVP-TK-00001

RETAGGED LEH-CRN-00009 TO LEH-CRN-00003

REVISED RAD CLASSIFICATION FOR L-0211, L-0213, L-0215 FROM R2/C2 TO R3/R2/C2.

3. CONT.

REVISED TO INCORPORATED DCN 24590-LAW-P1N-P01T-00020 AND FCR *24590-WTP-FC-C-05-0248
RELEASED HOLDS 1, 2, 3, 6, 7, 8, AND 9, ADDED NOTE 4, HOLDS 11, 12, AND 13, AND CHANGES IN 24590-LAW-M6N-LVP-00019, CHANGE RAD CLASS. OF ROOM L-0217A FROM R3/C3 TO R5/R3/C3, ADDED CONTROLLED ACCESS AND EMERGENCY EXIT CALL OUTS ON CHASE ACCESS POINTS AND STAIR ENTRANCES, ADDED CONTROL PANEL.

4. AIR HANDLING UNIT SIZING AND LOCATION TO BE SUPPLIED BY ANNEX HVAC SUBCONTRACTOR.
5. 24590-LAW-P1N-P01T-00026 MOVED LCH05 DOOR FOR RELOCATION OF C2V-ACU-00005. REVISED LEH-CRN-00003 TO REFLECT CURRENT VENDOR DATA. REVISED DESIGN AND LOCATION OF C2V-ACU-00005 AND C2V-ACU-00006 FROM SINGLE UNITS TO SPLIT CONDENSER UNITS AND ADDED C2V-COND-00005 AND C2V-COND-00006. ADDED LOP-HTR-00001, 00002 IN LC0201. ADDED CALL OUTS AND ROTATED DOW-SHR-00011, 00012, AND 00013. ADDED CALL OUTS FOR LP0217A, 20-CRN-00003, LEH-CRN-00005, LEH-CRN-00006, AND ANNEX ROOF. ADDED CALL OUTS AND REVISED LAYOUT OF C1V-AHU-00030, C1V-AHU-00032, C1V-ACU-00024A, AND C1V-ACU-00024B BETWEEN COLUMN LINES DD-EE AND 5.6-9 TO REFLECT CURRENT BOUNDING DIMENSIONS. REVISED AND RELOCATED LFH-HST-00001. REMOVED WALL SEPARATING L-0216 AND L-0214. REMOVED CORRIDOR DOOR FOR L-0216 AND L-0220 AND ADDED STILES. REVISED BOTTOM OF RAIL (B.O.R.) ELEVATION TO MONORAIL IN ROOM L-0226. REVISED LOCATION OF L-0208 DOOR AT COL. J/15. REVISED LOCATION OF L-0202 DOOR AT COL. C/14. REVISED WALLS FOR LST01, LST02, AND LCH01, AND REVISED WEST WALL OF LC0206. REVISED LAYOUT OF L-0227 AND RELOCATED DOORS. ADDED LADDER CALL OUT TO LP0217A. REVISED RADIOLOGICAL CLASSIFICATION IN ROOMS L-0217A AND L-0217B. ADDED HOLD 14. REMOVED (BELOW) CALL OUT TO FCU AND ACU (ABOVE) CALL OUT IN ROOM L-0221. ADDED (BELOW) TO CALL OUT L-0217.

Best Available Copy

REV	DESCRIPTION	ORG	CHKD	RVWD	APVD	DATE
3	REVISED TO INCORPORATE CHANGES IN NOTE 5	TH	CMS	JM	QK	2/5/07
2	REVISED TO INCORPORATE CHANGES IN NOTE 3	DLL	CMS	PR	DRJ	12/19/05
0	ISSUED FOR DESIGN-SUPERSEDES DWG-W375LV-PL00045, REV D	CS	AH	RM	CW	06-02-03

REVISION HISTORY

ISSUED BY RPP-WTP PDC
ISSUE STAMP

PROJECT No.	24590
SITE	HANFORD
AREA	200E
BUILDING No.	20

RIVER PROTECTION PROJECT
WASTE TREATMENT PLANT
2435 STEVENS CENTER PLACE
RICHLAND, WA 99354

CONTRACT No: DE-AC27-01RV14136

	BY	DATE
ORIGINATOR	SALERNO, CRAIG	06-02-03
CHECKER	HARSHFIELD, ALAN	06-02-03
APPROVER	WINKLER, CLIFFORD	06-02-03
REVIEWER	MOSSBRUCKER, ROBERT	06-02-03

CONTENT APPLICABLE TO ALARA? [X] YES [ ] NO
ADR NO. 24590-LAW-ADR-PL-03-001 REV: 2
SAFETY SCREEN REQUIRED? [X] YES [ ] NO E&NS INITIAL IF YES DEK

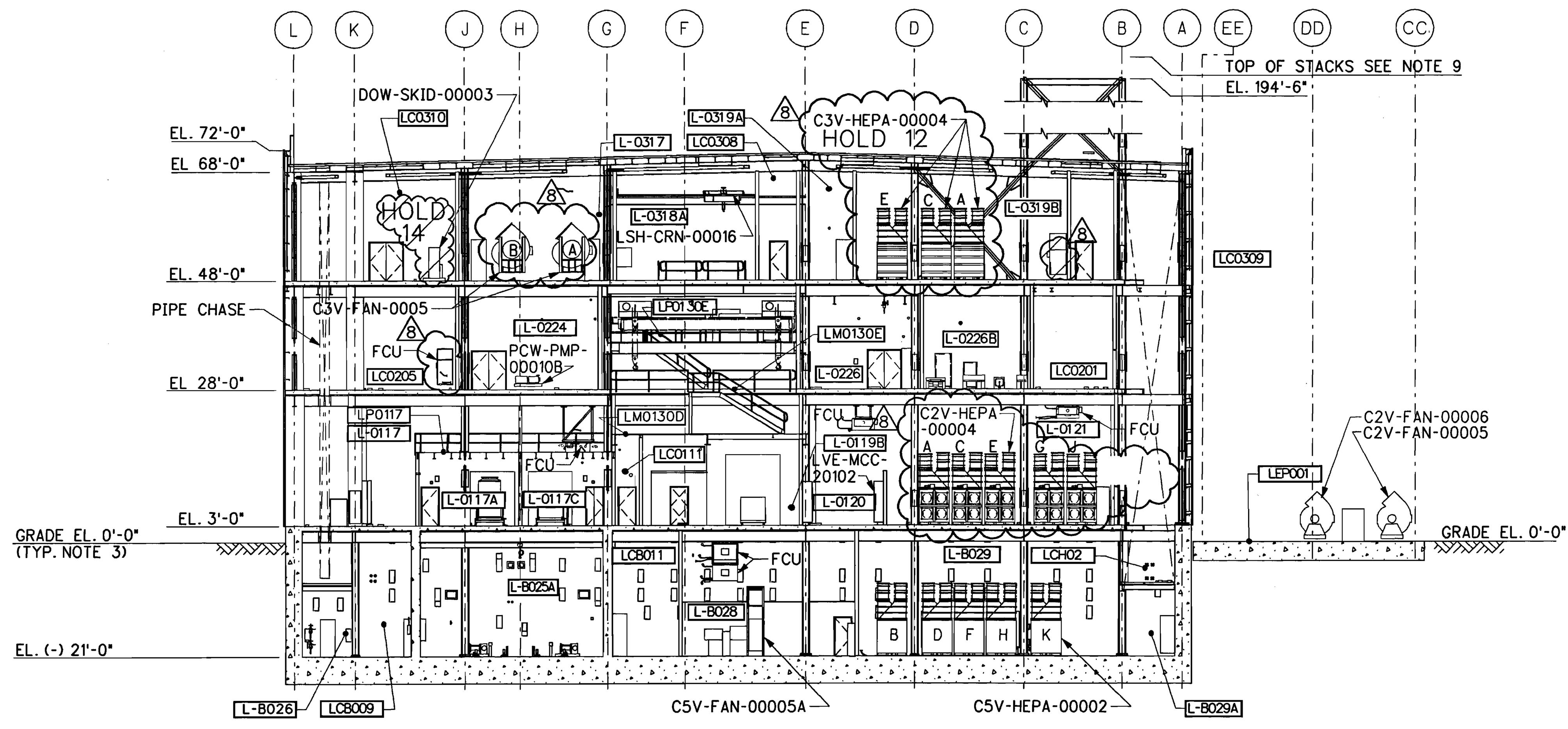
LAW VITRIFICATION BUILDING GENERAL ARRANGEMENT PLAN AT EL. 28'-0"

SCALE: 1/16"=1'-0"

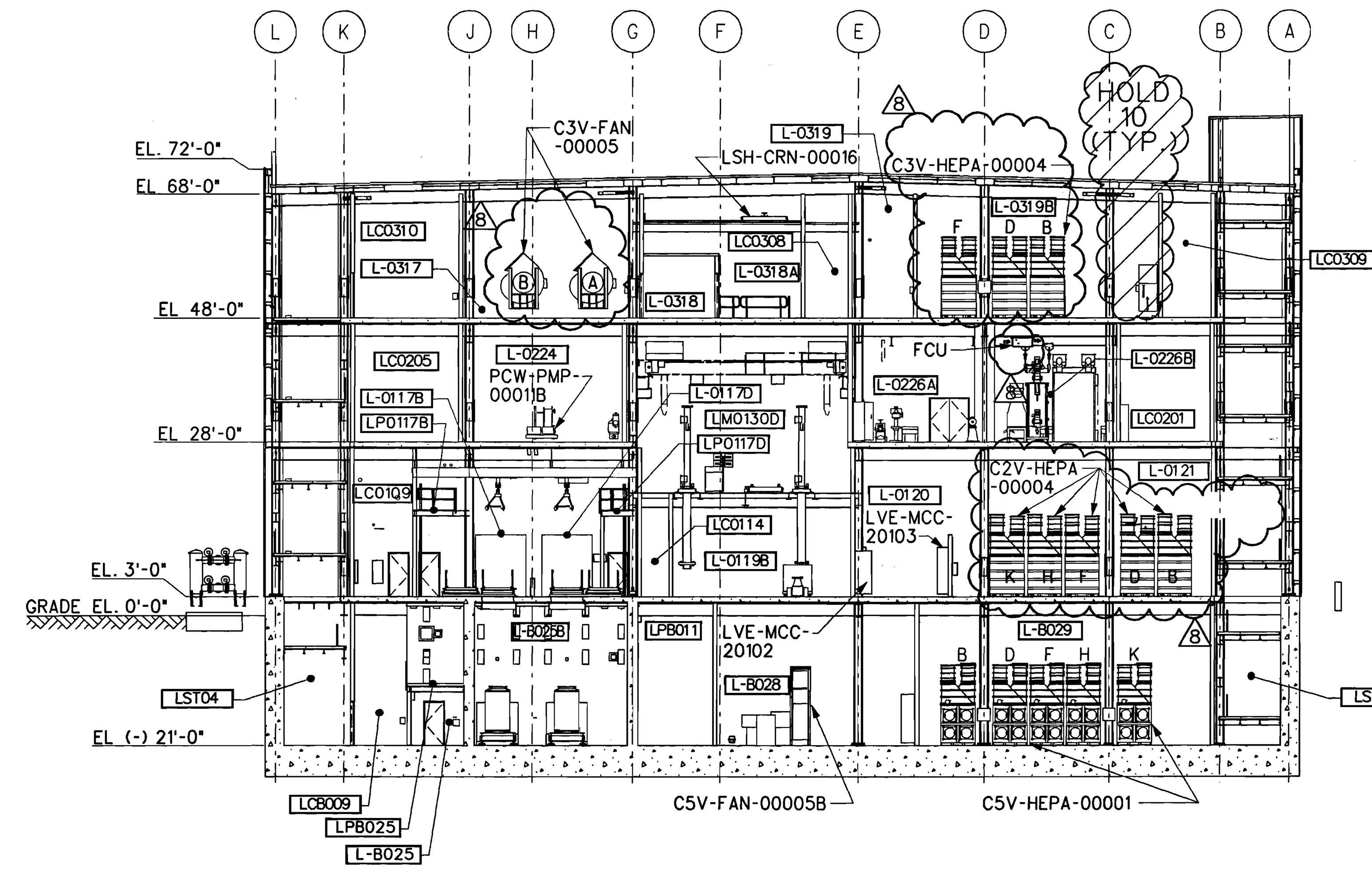
24590-LAW-P1-P01T-00004

REV 3

PLOTTED BY: tehawkin
Wor: dms06392\24590LAWP1P01T00004.DGN



SECTION A
P1-P01T-00001 THRU 00006



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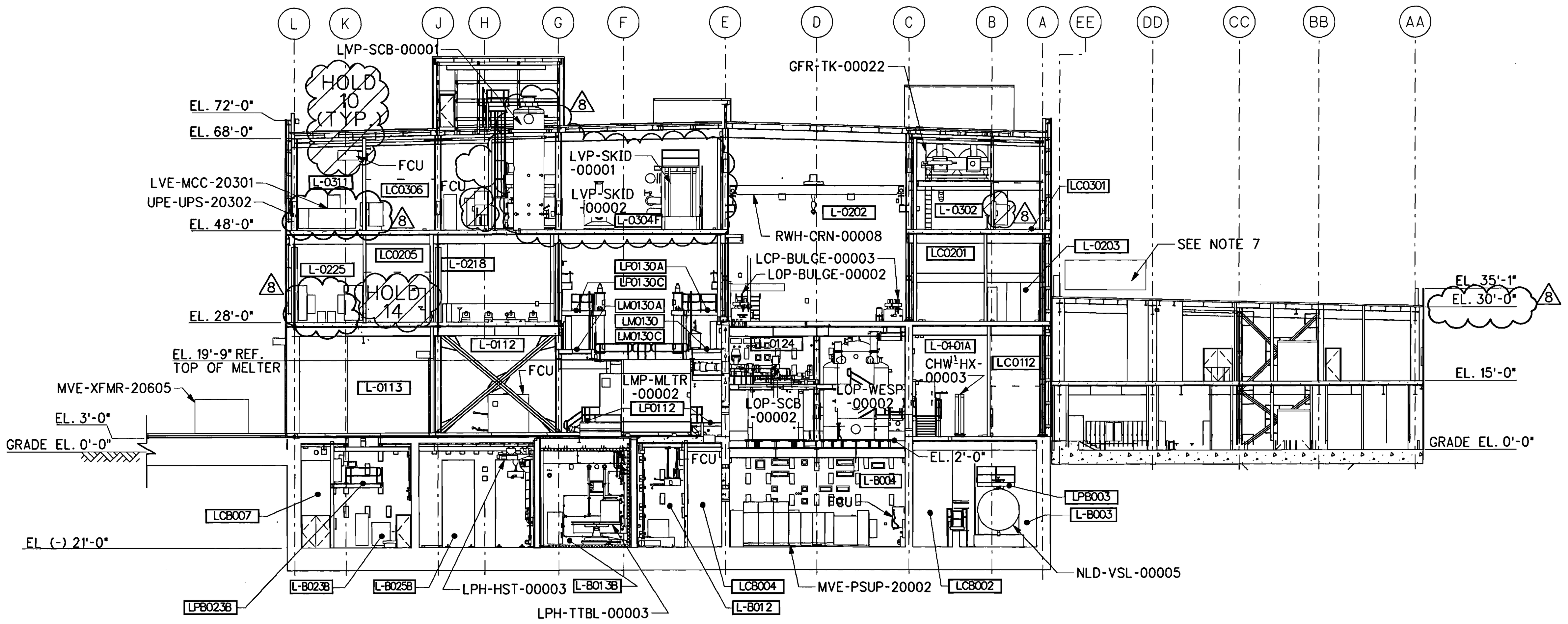
P1-P01T-00001 THRU 00006



SECTION B
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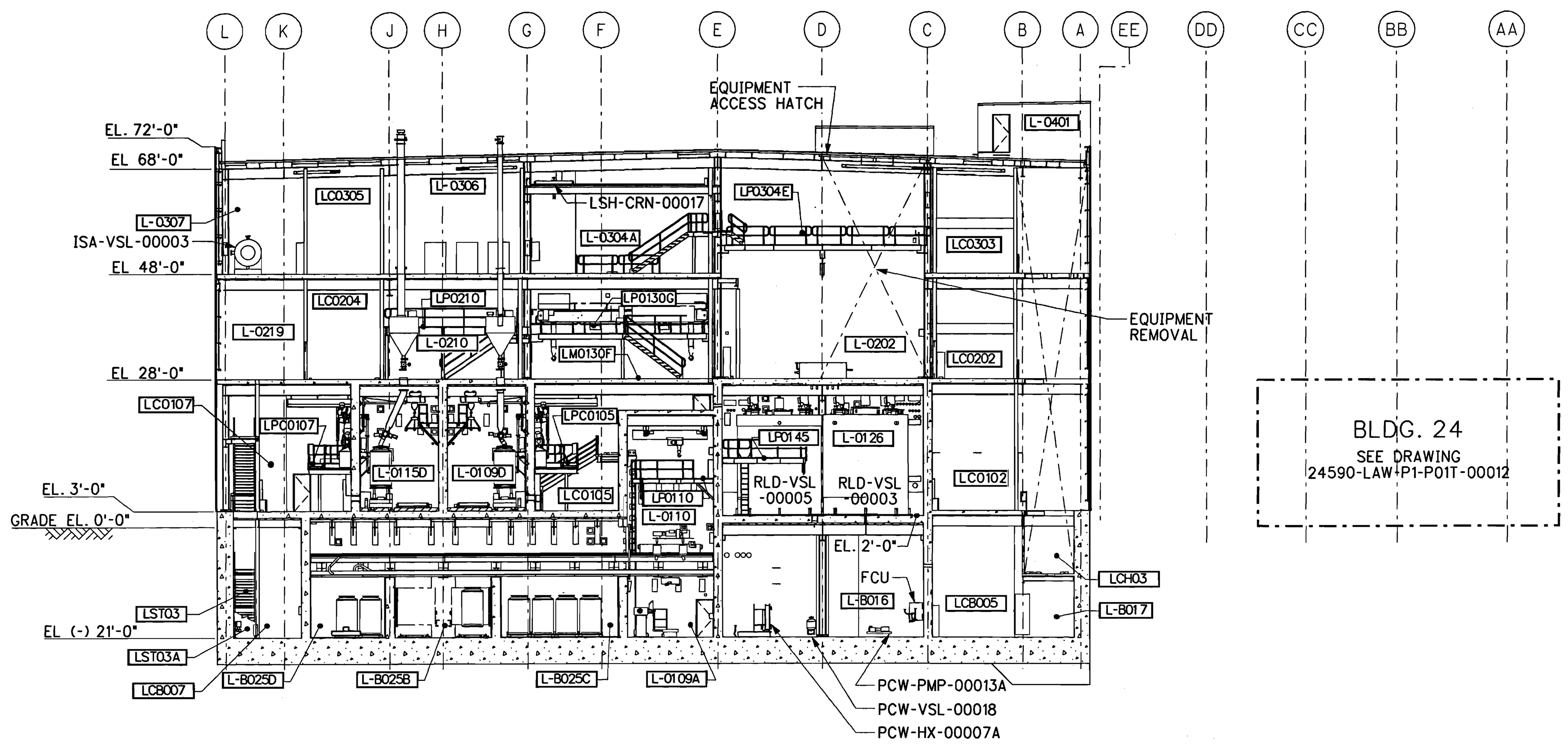


SECTION C
P1-P01T-00001 THRU 00006

BLDG. 24
SEE DRAWING
24590-LAW-P1-P01T-00012

NOTES:

1. FOR GENERAL NOTES, SEE 24590-LAW-P1-P01T-00001.
2. FOR INCORPORATED DESIGN CHANGE DESCRIPTIONS, SEE DRAWING 24590-LAW-P1-P01T-00003 REV. 1, NOTE 4.
3. ELEVATION 0'-0" IS EQUAL TO SITE EL. 678'-0" (MSL).
4. ADR'S FOR ELEVATIONS ARE AS FOLLOWED:
   24590-LAW-ADR-PL-02-003, REV. 1 FOR ELEVATION (-)21'-0"
   24590-LAW-ADR-PL-02-002, REV. 0 FOR ELEVATION 3'-0"
   24590-LAW-ADR-PL-03-005, REV. 0 FOR ELEVATION 22'-0"

   24590-LAW-ADR-PL-03-001, REV. 2 FOR ELEVATION 28'-0"

   24590-LAW-ADR-PL-03-006, REV. 0 FOR ELEVATION 48'-0"
   24590-LAW-ADR-PL-03-007, REV. 1 FOR ELEVATION 68'-0"
5. CONTENTS OF THIS DOCUMENT ARE DANGEROUS WASTE PERMIT AFFECTING.
6. REVISED TO INCORPORATE THE FOLLOWING;

   ADDED HOLD NOTES 12, 13, 14, 15 AND ROOM LC0310 (CORRIDOR).

   REDESIGNED OFF GAS SYSTEM. RENUMBERED ROOMS L-0304A TO L-0304F, L-0304E TO L-0304A, L-0309 TO L-0307, AND REVISED HOLD NOTE 9.

   DELETED HOLD NOTE 3

   DELETED MVE-XFMR-20602 AND LEP002

   REVISED HOLD NOTE 2

   REVISED C3 WORKSHOP LAYOUT (L-0226 & L-0226A).

   REVISED PCW EQUIPMENT LAYOUT (L-0224)

   REVISED OVERHEAD DOOR SIZE (L-0119B)

   REVISED CCB'S AND SUPPORT PLATFORM (LM0130)

   REVISED PUMP LAYOUT (L-0218)

   DELETED MELTER ANNULUS EQUIPMENT AND PLATFORMS (L-0112)

   REVISED FINISH LINE EQUIPMENT, INERT FILL DAY BINS, INERT FILL HOPPERS (L-0210, L-0109D, L-0115D)

   REVISED CONSUMABLE IMPORT/EXPORT LAYOUT (L-0119B, LP0130F)

   RETAGED PCW-EVAP-00004 TO PCW-VSL-00018

   REVISED TO REISSUE (-)21'-0", 3'-0", AND 22'-0" ELEVATIONS, RELEASED HOLDS 2, 4, 7, AND 15. REVISED HOLDS 10, 12. REVISED ANNEX COLUMN GRID. LOCATED FCU'S, ADDED CALL OUTS. ADDED NOTES 7, 8.

   REVISED TO REISSUE 68'-0" ELEVATION, RELEASED HOLDS 6, 8, 9, AND 11, DELETED NOTE 8, REVISED NOTE 4, HOLD 5, 10, AND 12, ADDED NOTE 9.

   8 RELEASED HOLDS 5, 12, AND 13, RELOCATED FCU'S ON EL. 48'-0", RELOCATED AND MODIFIED ELECTRICAL EQUIPMENT IN ROOMS L-0311 AND L-0225, MODIFIED HOLD 10 TO RELEASE EL. 28' FCU'S FROM HOLD.
7. AIR HANDLING UNIT SIZING AND LOCATION TO BE SUPPLIED BY ANNEX HVAC SUBCONTRACTOR.
8. DELETED
9. TOP OF STACK ELEVATIONS:
   C2 HVAC EXHAUST - 105'-0"
   C3 HVAC EXHAUST - 198'-6"
   C5 HVAC EXHAUST - 198'-6"
   LVP SECONDARY OFF GAS - 198'-6"

HOLDS:

1. DELETED
2. DELETED
3. DELETED
4. DELETED
5. DELETED (8)
6. DELETED
7. DELETED
8. DELETED
9. DELETED
10. FAN COIL UNITS SIZING AND LOCATION PENDING VENDOR SELECTION FOR ELEVATION 48' TO BE PROVIDED BY LAW HVAC ENGINEERING.
11. DELETED
12. DELETED (8)
13. DELETED
14. TEMPERED WATER SYSTEM PENDING VENDOR SELECTION TO BE PROVIDED BY MECHANICAL SYSTEMS.
15. DELETED

REV	DESCRIPTION	ORG	CHKD	RVWD	APVD	DATE
8	REVISED TO INCORPORATE CHANGES IN NOTE 6	[illegible]	CMS	PR	[illegible]	12/19/05
7	REVISED TO INCORPORATE CHANGES IN NOTE 6	DLL	CMS	PR	DJ	11/16/05
6	REVISED TO INCORPORATE CHANGES IN NOTE 6	DLL	CMS	PR	KK	2/8/05
0	ISSUED FOR CONSTRUCTION-SUPERSEDES DWG-W375LV-PL00048, REV D	AH	RM	N/A	SCF	9/17/01

REVISION HISTORY

ISSUED BY RPP-WTP PDC
ISSUE STAMP

PROJECT No.	24590
SITE	HANFORD
AREA	200E
BUILDING No.	20

BECHTEL
RIVER PROTECTION PROJECT
WASTE TREATMENT PLANT
2435 STEVENS CENTER PLACE
RICHLAND, WA 99354

CONTRACT No: DE-AC27-01RV14136

	BY	DATE
ORIGINATOR	ALAN HARSHFIELD	9/17/01
CHECKER	ROBERT MOSSBRUCKER	9/17/01
APPROVER	STEVE C FOELBER	9/17/01
REVIEWER	N/A	N/A

LAW VITRIFICATION BUILDING GENERAL ARRANGEMENT SECTION A-A, B-B, C-C AND S-S

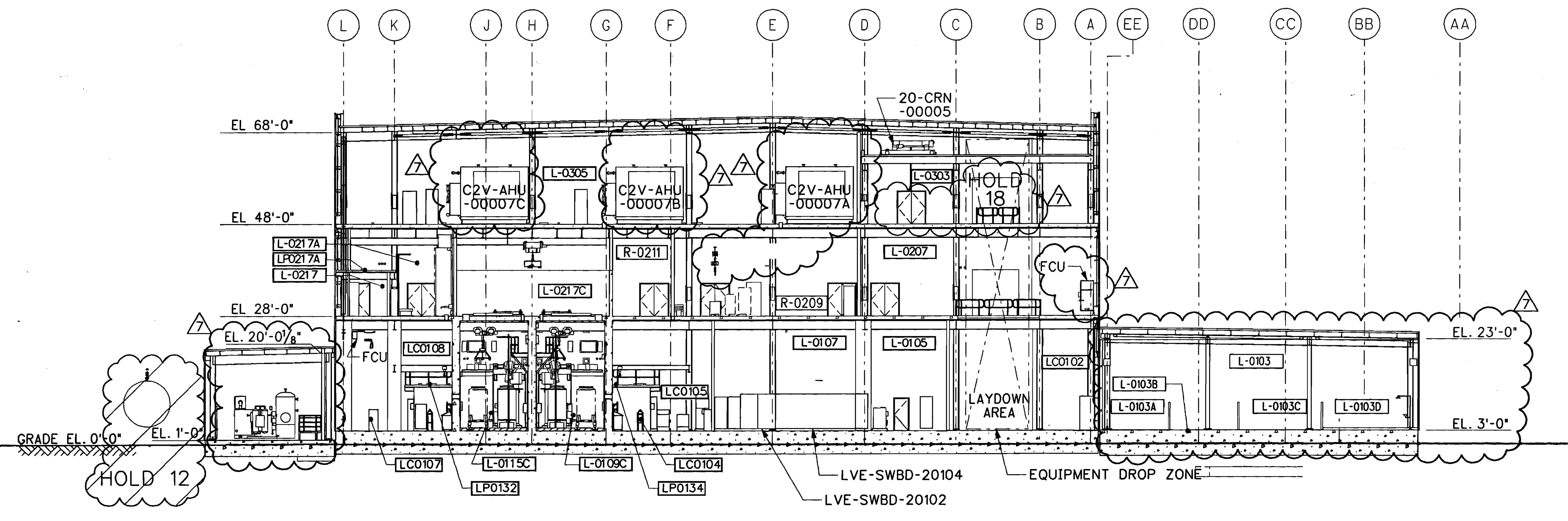
CONTENT APPLICABLE TO ALARA? [X] YES [ ] NO
ADR NO. SEE NOTE 4 REV:
SAFETY SCREEN REQUIRED? [ ] YES [X] NO E&NS INITIAL IF YES ____

SCALE: 1/16"=1'-0"
24590-LAW-P1-P01T-00007
REV 8

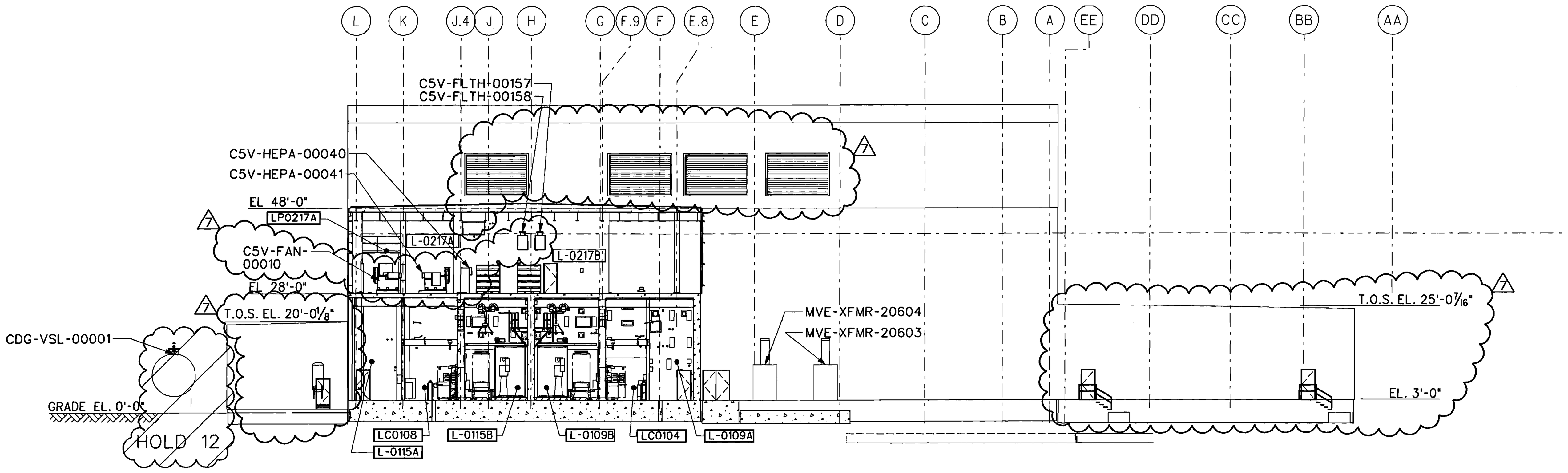
SAFETY SCREEN IS REQUIRED FOR DRAWING TYPES IDENTIFIED IN 24590-WTP-GPP-SREG-002
'E' SIZE - 44x34
COMPUTER GENERATED - MANUAL CHANGES NOT PERMITTED
R10594612
12/19/2005 12:19:01 PM

PLOTTED BY: arfuller
C:\Work\dms06392\24590LAWP1P01T00007.DGN

FORM E_SDN.DGN 02/2003



SECTION D
P1-P01T-00002 THRU 00006



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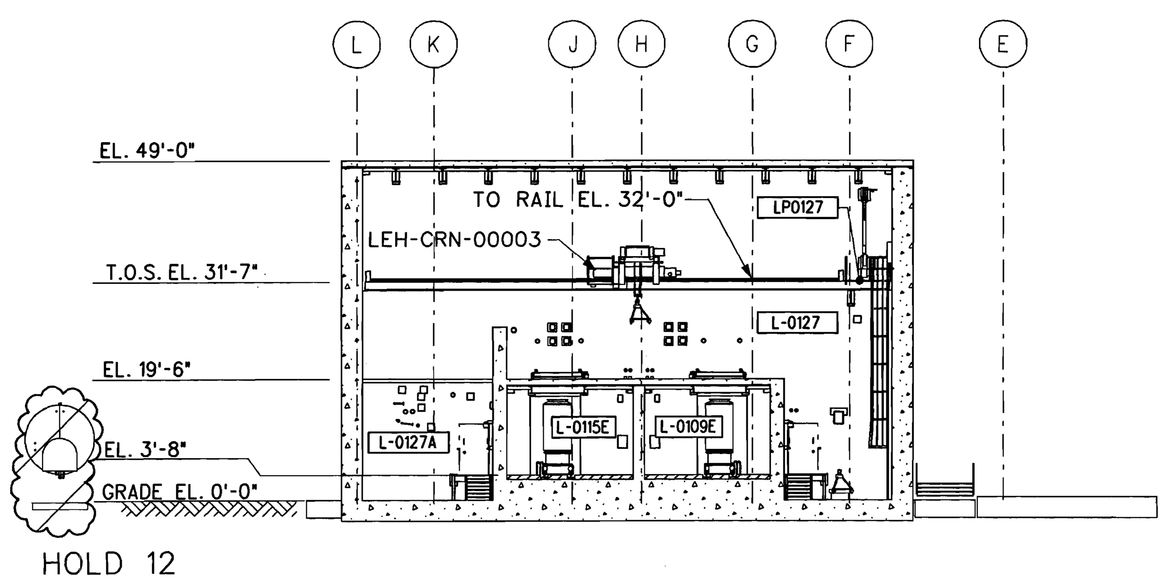
P1-P01T-00002 THRU 00005



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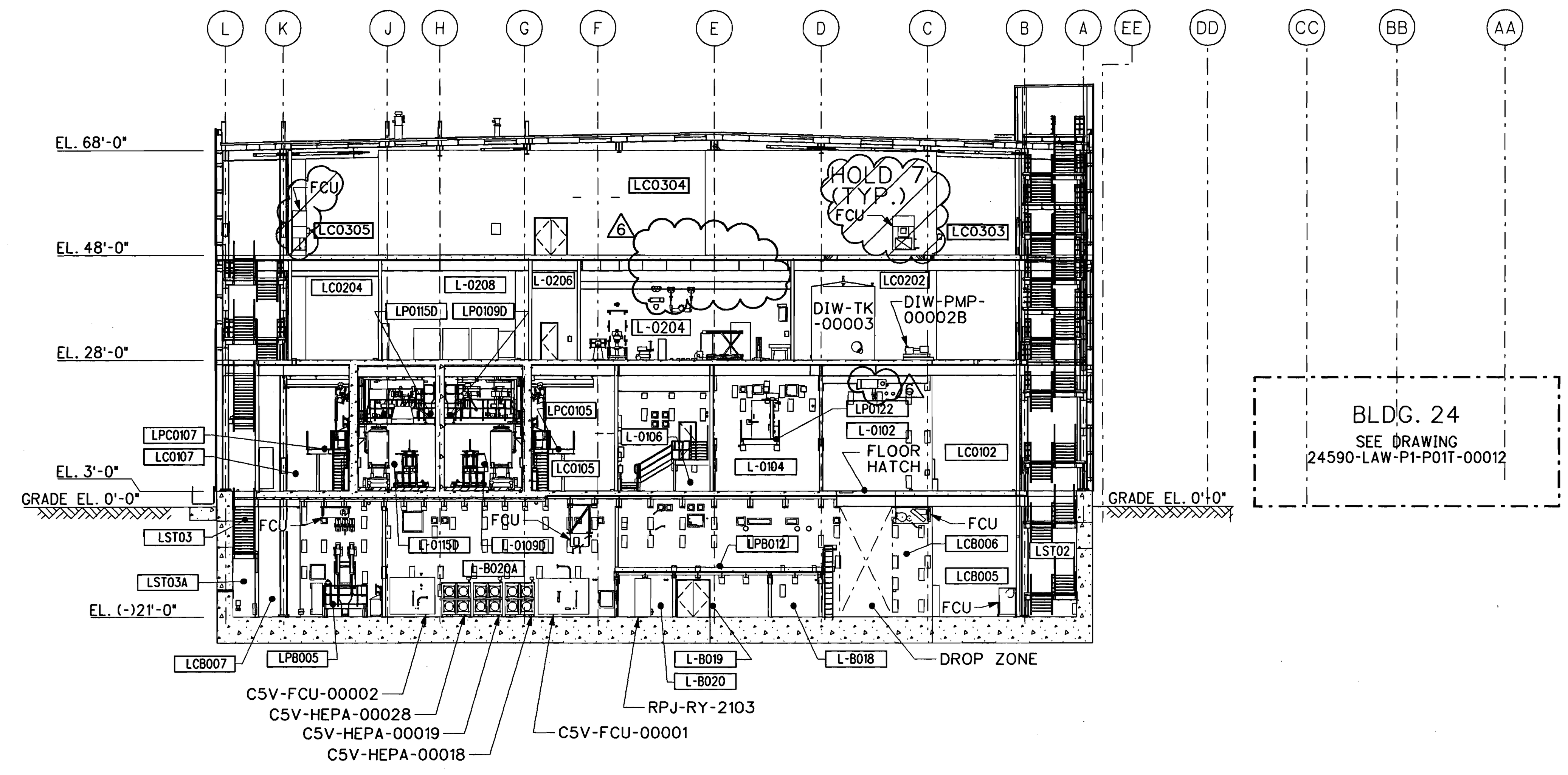
P1-P01T-00002 THRU 00004



SECTION T
P1-P01T-00001 THRU 00006

BLDG. 24
SEE DRAWING
24590-LAW-P1-P01T-00012

NOTES:

1. FOR GENERAL NOTES, SEE 24590-LAW-P1-P01T-00001.
2. FOR INCORPORATED DESIGN CHANGE DESCRIPTIONS, SEE DRAWINGS 24590-LAW-P1-P01T-00003 REV. 1, NOTE 4.
3. ADR'S FOR ELEVATIONS ARE AS FOLLOWED:
   24590-LAW-ADR-PL-02-003, REV. 1 FOR ELEVATION (-)21'-0"
   24590-LAW-ADR-PL-02-002, REV. 0 FOR ELEVATION 3'-0"
   24590-LAW-ADR-PL-03-005, REV. 0 FOR ELEVATION 22'-0"
   24590-LAW-ADR-PL-03-001, REV. 2 FOR ELEVATION 28'-0"
   24590-LAW-ADR-PL-03-006, REV. 0 FOR ELEVATION 48'-0"
   24590-LAW-ADR-PL-03-007, REV. 1 FOR ELEVATION 68'-0"
4. CONTENTS OF THIS DOCUMENT ARE DANGEROUS WASTE PERMIT AFFECTING.
5. ADDED HOLDS TO FAN COIL UNITS, HOLD NOTE FOR INTAKE LOUVER AND PLENUM, AND AIR HANDLING UNITS.
6. ADDED C2 WORKSHOP EQUIPMENT. (L-0204)

   UPDATED DIW PUMPS. (LC0202)

   UPDATED FINISH LINE EQUIPMENT (L-0109D & L-0115D)

   REVISED SHIELD DOOR LOCATION (L-0104)

   ~~REVISED FINISH LINE SHIELD WINDOW MONORAILS (LC0105 & LC0108)~~

   ADDED HOLD 12,13,14,15, DELETED HOLD NOTE 9, AND REVISED HOLD NOTE 8.

   ADDED DECON EXHAUST EQUIPMENT

   REVISED TO REISSUE (-) 21'-0", 3'-0", AND 22'-0" ELEVATIONS, DELETED HOLDS 2,3,4,5, AND 10, ADDED HOLD 16, RELOCATED FCU'S, REVISED ANNEX COLUMN GRID, ELECTRICAL BUILDING MOVED TO DGN. 24590-LAW-P1-P01T-00012, ADDED NOTE 7.

   RELEASED HOLD 6, FINALIZED 68'-0" ELEVATION, DELETED NOTE 7, REVISED NOTE 3, HOLD 7, 8, 11, 13, 14, AND 15, ADDED HOLD 17.

   7 RELEASED HOLDS 8, 11, 13, 14, 15, 16, AND 17, MODIFIED HOLD 10 TO RELEASE EL. 28' FCU'S FROM HOLD
7. DELETED

HOLDS:

1. DELETED.
2. DELETED.
3. DELETED.
4. DELETED.
5. DELETED.
6. DELETED.
7. FAN COIL UNITS SIZING AND LOCATION PENDING VENDOR SELECTION FOR ELEVATION 48' TO BE PROVIDED BY LAW HVAC ENGINEERING. 7
8. DELETED 7
9. DELETED
10. DELETED
11. DELETED 7
12. CO2 VESSEL PENDING VENDOR PACKAGE DESIGN.
13. DELETED 7
14. DELETED
15. DELETED
16. DELETED
17. DELETED
18. WALL PENDING EVALUATION OF OPERATIONAL REQUIREMENTS.

REV	DESCRIPTION	ORG	CHKD	RVWD	APVD	DATE
7	REVISED TO INCORPORATE CHANGES IN NOTE 6	DLL	CMS	PR	DJ	12/19/05
6	REVISED TO INCORPORATE CHANGES IN NOTE 6	DLL	CMS	PR	DJ	11/16/05
5	REVISED TO INCORPORATE CHANGES IN NOTE 6	DLL	CMS	PR	KK	2/8/05
0	ISSUED FOR DESIGN - SUPERSEDES DWG-W375LV-PL00049, REV D	AH	RM	N/A	GD	7/3/02

REVISION HISTORY

ISSUED BY RPP-WTP PDC
ISSUE STAMP

PROJECT No.	24590	
SITE	HANFORD	
AREA	200E	
BUILDING No.	20	
	BY	DATE
ORIGINATOR	ALAN HARSHFIELD	7/3/02
CHECKER	ROBERT MOSSBRUCKER	7/3/02
APPROVER	GARTH DUNCAN	7/3/02
REVIEWER	N/A	N/A

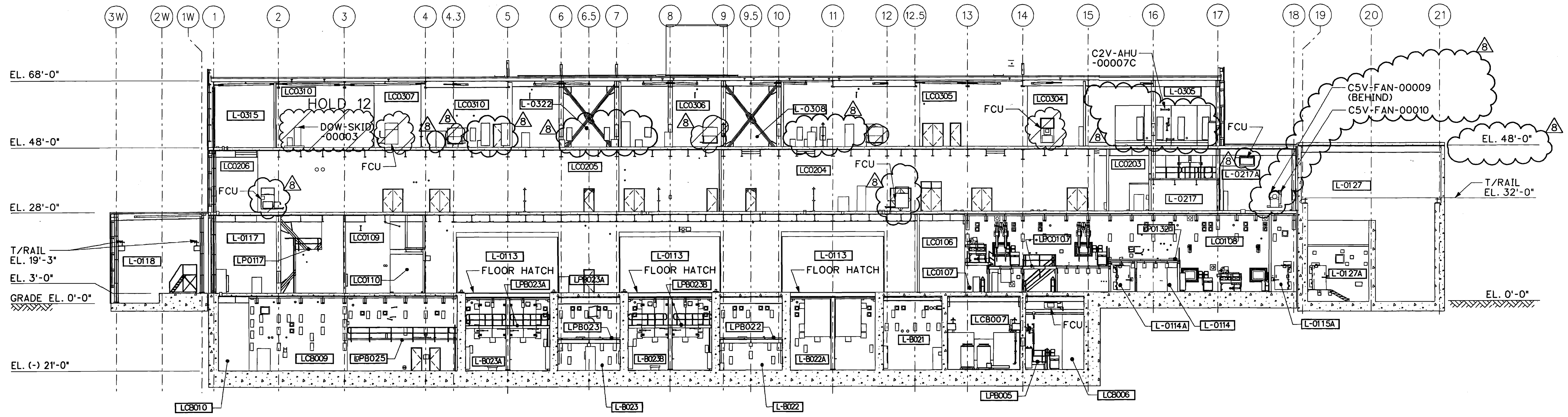
CONTENT APPLICABLE TO ALARA? [X] YES [ ] NO
ADR NO. SEE NOTE 3 REV:
SAFETY SCREEN REQUIRED? [ ] YES [X] NO E&NS INITIAL IF YES ____

BECHTEL
RIVER PROTECTION PROJECT
WASTE TREATMENT PLANT
2435 STEVENS CENTER PLACE
RICHLAND, WA 99354

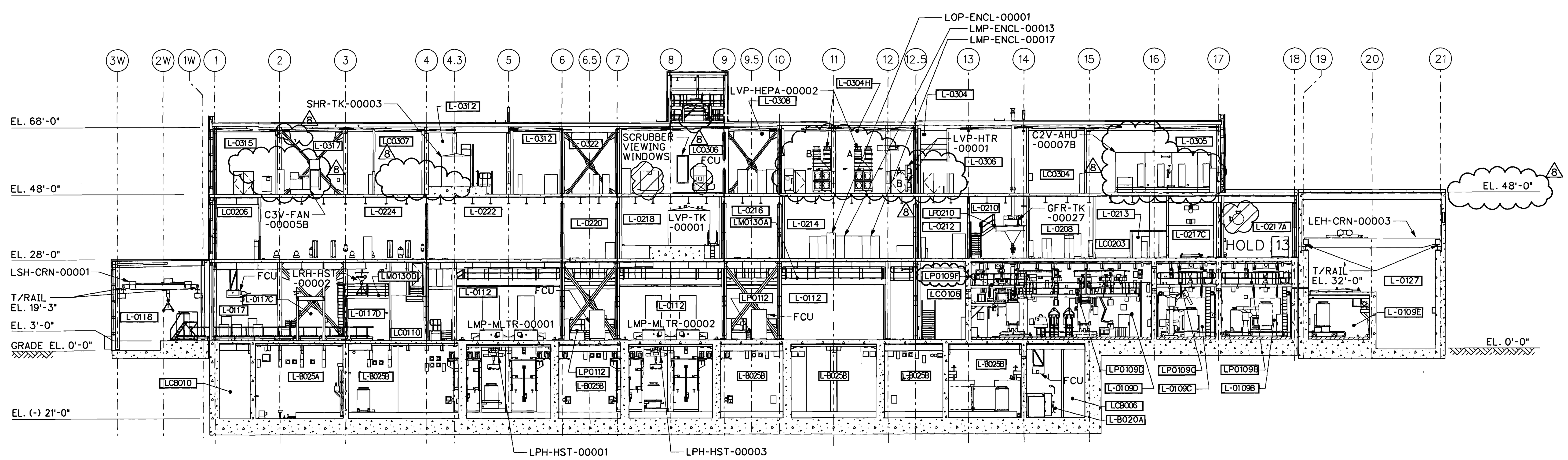
CONTRACT No: DE-AC27-01RV14136

LAW VITRIFICATION BUILDING GENERAL ARRANGEMENT SECTION D-D, E-E, F-F AND T-T

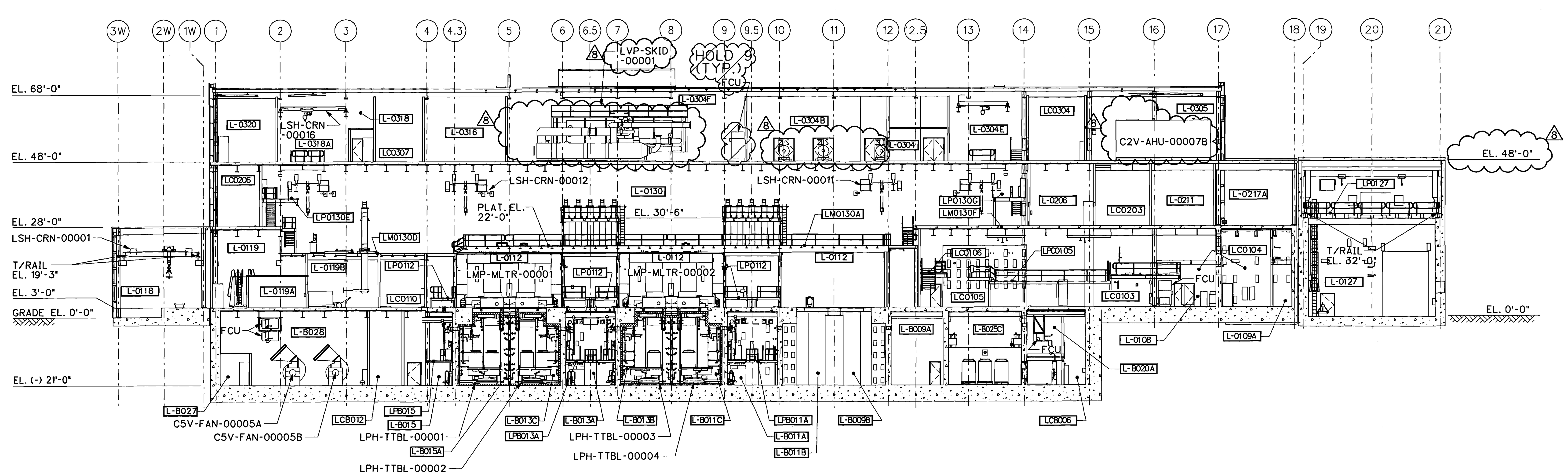
SCALE: 1/16"=1'-0"
24590-LAW-P1-P01T-00008
REV 7



SECTION G
P1-P01T-00001 THRU 00006



SECTION H
P1-P01T-00001 THRU 00006



SECTION J
P1-P01T-00001 THRU 00006

NOTES:

1. FOR GENERAL NOTES, SEE 24590-LAW-P1-P01T-00001.
2. FOR INCORPORATED DESIGN CHANGE DESCRIPTIONS, SEE DRAWINGS 24590-LAW-P1-P01T-00003 REV. 1, NOTE 4.
3. ADR'S FOR ELEVATIONS ARE AS FOLLOWED:
   24590-LAW-ADR-PL-02-003, REV. 1 FOR ELEVATION (-)21'-0"
   24590-LAW-ADR-PL-02-002, REV. 0 FOR ELEVATION 3'-0"
   24590-LAW-ADR-PL-03-005, REV. 0 FOR ELEVATION 22'-0"
   24590-LAW-ADR-PL-03-001, REV. 2 FOR ELEVATION 28'-0"
   24590-LAW-ADR-PL-03-006, REV. 0 FOR ELEVATION 48'-0"
   24590-LAW-ADR-PL-03-007, REV. 1 FOR ELEVATION 68'-0"
4. CONTENTS OF THIS DOCUMENT ARE DANGEROUS WASTE PERMIT AFFECTING.
5. ADDED HOLD NOTES 12, 13, 14, 15, AND ROOM LC0310.
6. REVISIONS:

   ADDED HOLD NOTE 16, AND DECON EXHAUST EQUIPMENT

   CONVERTED FCU UNITS TO FLOOR MOUNTED (LC0204 AND LC0205)

   REVISED DOOR LOCATIONS (LC0205)
   REVISED LAYOUT (L-0224, L-0222, L-0220)
   REVISED WALL LAYOUT (L-0218)
   REVISED MELTER ROLL-UP DOOR SIZE (L-0113)
   REVISED CCB PLATFORMS (L-01030)
   REVISED GFR DAY BINS (L-0210)
   REVISED CO2 PELLETIZER LAYOUT (L-0213)

   DELETED CONTROL CABINETS (L-0117), AND HOLD NOTES 4 AND 5.

   RETAGED LEH-CRN-00009 TO LEH-CRN-00003

   REVISED TO REISSUE (-) 21'-0", 3'-0", AND 22'-0" ELEVATIONS, DELETED HOLDS 2,3,7,11, AND 16, REVISED HOLDS 9,13, AND 14, FINALIZED FCU LOCATIONS FOR (-) 21'-0", 3'-0", AND 22'-0".

   RELEASED HOLD 8, AND 17, FINALIZED 68'-0" ELEVATION, MODIFIED HOLD 6, 9, 10, 13, 15, AND HOLD 3.

   8 RELEASED HOLDS 6, 10, 13, AND 15, RELOCATED ELECTRICAL EQUIPMENT BASED ON VENDOR INFORMATION, MODIFIED HOLD 9 TO RELEASE EL. 28' FCU'S FROM HOLD, MODIFIED HOLD 13 TO RELEASE C5V BLOWERS AND HEPA FILTERS FROM HOLD.

HOLDS:

1. DELETED
2. DELETED
3. DELETED
4. DELETED
5. DELETED
6. DELETED
7. DELETED
8. DELETED
9. FAN COIL UNITS SIZING AND LOCATION PENDING VENDOR SELECTION FOR ELEVATION 48'-0" TO BE PROVIDED BY LAW HVAC ENGINEERING.
10. DELETED
11. DELETED
12. TEMPERED WATER SYSTEM PENDING VENDOR SELECTION. TO BE PROVIDED BY MECHANICAL SYSTEMS.
13. DELETED.
14. MELTER OFF GAS HEPA FILTERS PENDING VENDOR SELECTION. TO BE PROVIDED BY MECHANICAL SYSTEMS.
15. DELETED
16. DELETED
17. DELETED

REV	DESCRIPTION	ORG	CHKD	RVWD	APVD	DATE
8	REVISED TO INCORPORATE CHANGES IN NOTE 6	[illegible]	CMS	PR	[illegible]	12/19/05
7	REVISED TO INCORPORATE CHANGES IN NOTE 6	DLL	CMS	PR	DJ	11/16/05
6	REVISED TO INCORPORATE CHANGES IN NOTE 6	DLL	CMS	PR	KK	2/8/05
0	ISSUED FOR CONSTRUCTION- SUPERSEDES DWG-W375LV-PL00005, REC C	AH	RM	N/A	SCF	9/21/01

REVISION HISTORY

ISSUED BY RPP-WTP PDC
ISSUE STAMP

PROJECT No.	24590
SITE	HANFORD
AREA	200E
BUILDING No.	20

	BY	DATE
ORIGINATOR	ALAN HARSHFIELD	9/21/01
CHECKER	ROBERT MOSSBRUCKER	9/21/01
APPROVER	STEVE C FOELBER	9/21/01
REVIEWER	N/A	N/A

BECHTEL
RIVER PROTECTION PROJECT
WASTE TREATMENT PLANT
2435 STEVENS CENTER PLACE
RICHLAND, WA 99354

CONTRACT No: DE-AC27-01RV14136

LAW VITRIFICATION BUILDING GENERAL ARRANGEMENT SECTION G-G, H-H AND J-J

CONTENT APPLICABLE TO ALARA? [X] YES [ ] NO
ADR NO. SEE NOTE 3 REV:
SAFETY SCREEN REQUIRED? [ ] YES [X] NO E&NS INITIAL IF YES

SCALE: 1/16"=1'-0" | 24590-LAW-P1-P01T-00009 | REV 8

SAFETY SCREEN IS REQUIRED FOR DRAWING TYPES IDENTIFIED IN 24590-WTP-GPP-SREG-002

'E' SIZE - 44x34
COMPUTER GENERATED - MANUAL CHANGES NOT PERMITTED

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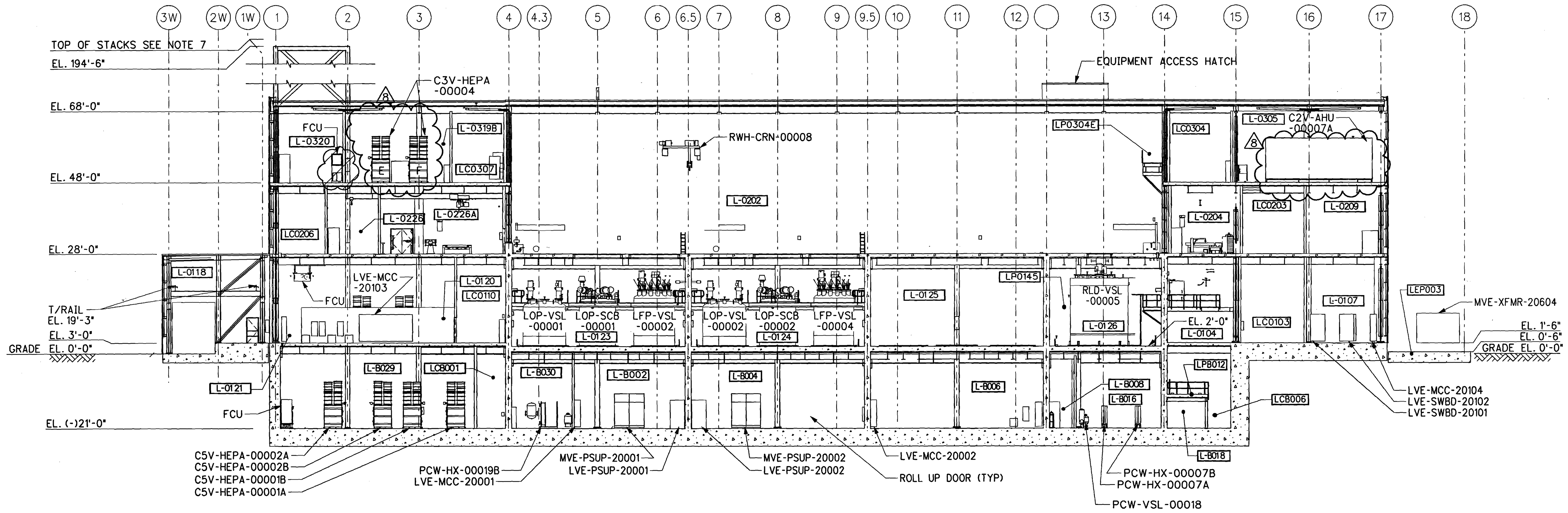
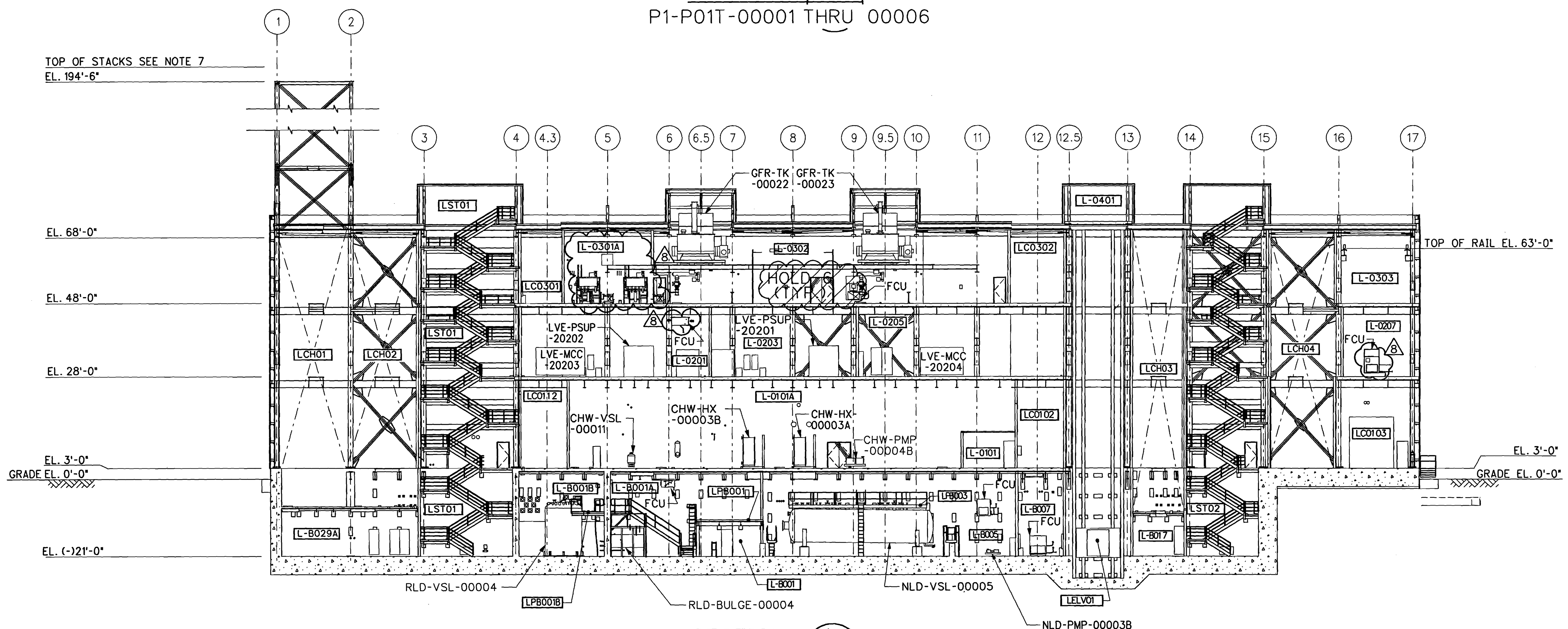


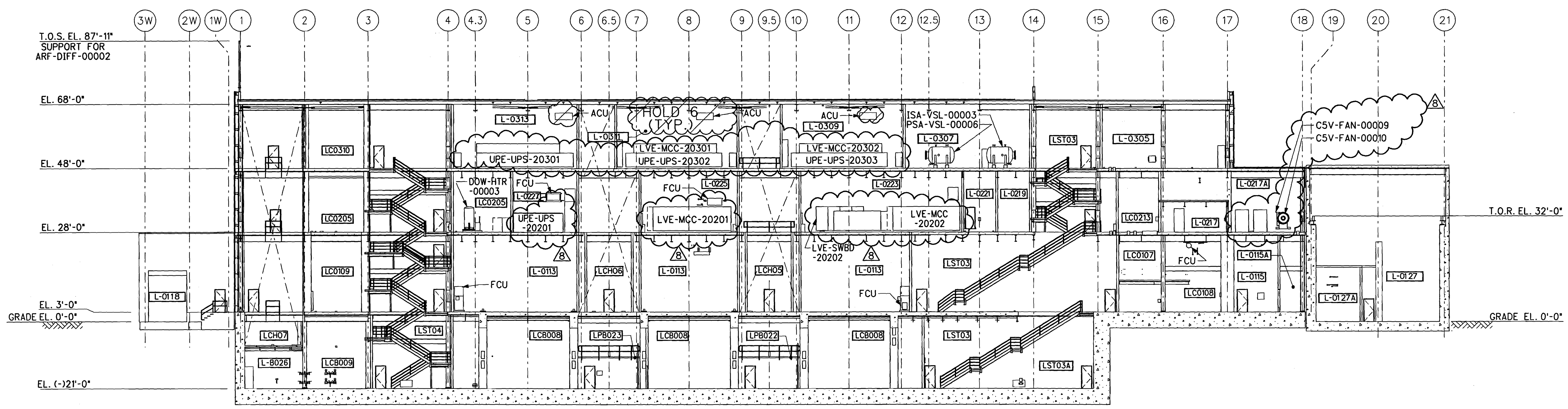
SECTION K

P1-P01T-00001 THRU 00006



SECTION L

P1-P01T-00001 THRU 00006



SECTION M

P1-P01T-00001 THRU 00006

NOTES:

1. FOR GENERAL NOTES, SEE 24590-LAW-P1-P01T-00001.
2. FOR INCORPORATED DESIGN CHANGE DESCRIPTIONS, SEE DRAWINGS 24590-LAW-P1-P01T-00003 REV. 1, NOTE 4.
3. ADR'S FOR ELEVATIONS ARE AS FOLLOWED:
   24590-LAW-ADR-PL-02-003, REV. 1 FOR ELEVATION (-)21'-0"
   24590-LAW-ADR-PL-02-002, REV. 0 FOR ELEVATION 3'-0"
   24590-LAW-ADR-PL-03-005, REV. 0 FOR ELEVATION 22'-0"
   24590-LAW-ADR-PL-03-001, REV. 2 FOR ELEVATION 28'-0"
   24590-LAW-ADR-PL-03-006, REV. 0 FOR ELEVATION 48'-0"
   24590-LAW-ADR-PL-03-007, REV. 1 FOR ELEVATION 68'-0"
4. CONTENTS OF THIS DOCUMENT ARE DANGEROUS WASTE PERMIT AFFECTING.
5. ADDED HOLD NOTES 9, 10. 11
   ADDED ROOM L-0301A (SUBCHANGE) AND GLASS FORMER REAGENT (GFR) SYSTEM. RELOCATED ELECTRICAL EQUIPMENT
   REVISED HOLD NOTE 8 AND RENUMBERED L-0301 TO L-0301A.
6. REVISED C3 WORKSHOP LAYOUT (L-.0226A AND L-0226)
   REVISED PROCESS CELL HATCH THICKNESS FROM 4" TO 2½" (L-0202)
   ADDED C2 WORKSHOP EQUIPMENT (L-0204)
   REVISED MCC LAYOUT (L-0120)
   REVISED SHIELD DOOR SIZE (L-0104)
   REVISED CDG EQUIPMENT LAYOUT (L-0115, L-0115A, L-0217A)
   REVISED LVE-MCC-20203 AND LVE-MCC-20204
   REVISED MISC. ELECTRICAL CABINETS (L-0201, L-0203 AND L-0205)
   REVISED DOW-HTR-00003
   REVISED LST03 EAST WALL LOCATION
   ADDED CHASE ACCESS DOORS.
   RETAGGED PCW-EVAP-00004 TO PCW-VSL-00018
   RETAGGED CHW-HX-00003 TO CHW-HX-00003B
   RETAGGED CHW-PMP-00001B TO CHW-PMP-00004B
   RETAGGED RLD-VSL-00004 TO RLD-BULGE-00001

   REVISED TO REISSUE (-) 21'-0", 3'-0", AND 22'-0" ELEVATIONS, RELEASED HOLDS 2,3, AND 7, REVISED HOLDS 4,6, AND 9, REVISED ELECTRICAL TAGS AS NOTED.

   RELEASED HOLDS 4, 5, AND 8, FINALIZED 68'-0" ELEVATION NOTE 7, MODIFIED HOLD 6, 10, 11, AND NOTE 3.

   8 RELEASED HOLDS 9, 10 AND 11, MODIFIED ROOMS L-0309, L-0311, L-0313, LCH05, AND LCH06, MODIFIED ELECTRICAL EQUIPMENT IN L-0223, L-0225, AND L-0227 PER VENDOR INFORMATION, MODIFIED HOLD 10 TO RELEASE EL. 28' FCU'S FROM HOLD.
7. TOP OF STACK ELEVATIONS:
   C2 HVAC EXHAUST - 105'-0"
   C3 HVAC EXHAUST - 198'-6"
   C5 HVAC EXHAUST - 198'-6"
   LVP SECONDARY OFFGAS - 198'-6"

HOLDS:

1. DELETED
2. DELETED
3. DELETED
4. DELETED
5. DELETED
6. FAN COIL UNITS AND AIR CONDENSING UNITS SIZING AND LOCATION PENDING VENDOR SELECTION FOR ELEVATION 48' TO BE PROVIDED BY LAW HVAC ENGINEERING.
7. DELETED
8. DELETED
9. DELETED
10. DELETED
11. DELETED

REV	DESCRIPTION	ORG	CHKD	RVWD	APVD	DATE
8	REVISED TO INCORPORATE CHANGES IN NOTE 6	DLL	CMS	PR	DJ	12/19/05
7	REVISED TO INCORPORATE CHANGES IN NOTE 6	DLL	CMS	PR	DJ	11/16/05
6	REVISED TO INCORPORATE CHANGES IN NOTE 6	DLL	CMS	PR	KK	2/8/08
0	ISSUED FOR CONSTRUCTION - SUPERSEDES DWG-W375LV-PL00051, REV C	AH	RM	N/A	SCF	9/21/01

REVISION HISTORY

ISSUED BY RPP-WTP PDC ISSUE STAMP		
PROJECT No.	24590	
SITE	HANFORD	
AREA	200E	
BUILDING No.	20	
	BY	DATE
ORIGINATOR	HARSHFIELD, ALAN	9/21/01
CHECKER	MOSSBRUCKER, ROBERT	9/21/01
APPROVER	FOELBER, STEVEN	9/21/01
REVIEWER	N/A	N/A

BECHTEL

RIVER PROTECTION PROJECT
WASTE TREATMENT PLANT
2435 STEVENS CENTER PLACE
RICHLAND, WA 99354

CONTRACT No: DE-AC27-01RV14136

LAW VITRIFICATION BUILDING GENERAL ARRANGEMENT SECTION K-K, L-L AND M-M

CONTENT APPLICABLE TO ALARA? [X] YES [ ] NO
ADR NO. SEE NOTE 3 REV:
SAFETY SCREEN REQUIRED? [ ] YES [X] NO E&NS INITIAL IF YES

SCALE: 1/16"=1'-0"

24590-LAW-P1-P01T-00010 REV 8

SAFETY SCREEN IS REQUIRED FOR DRAWING TYPES IDENTIFIED IN 24590-WTP-GPP-SREG-002

'E' SIZE - 44x34
COMPUTER GENERATED - MANUAL CHANGES NOT PERMITTED

R10594615

12/19/2005 01:35:57 PM

PLOTTED BY: arfuller
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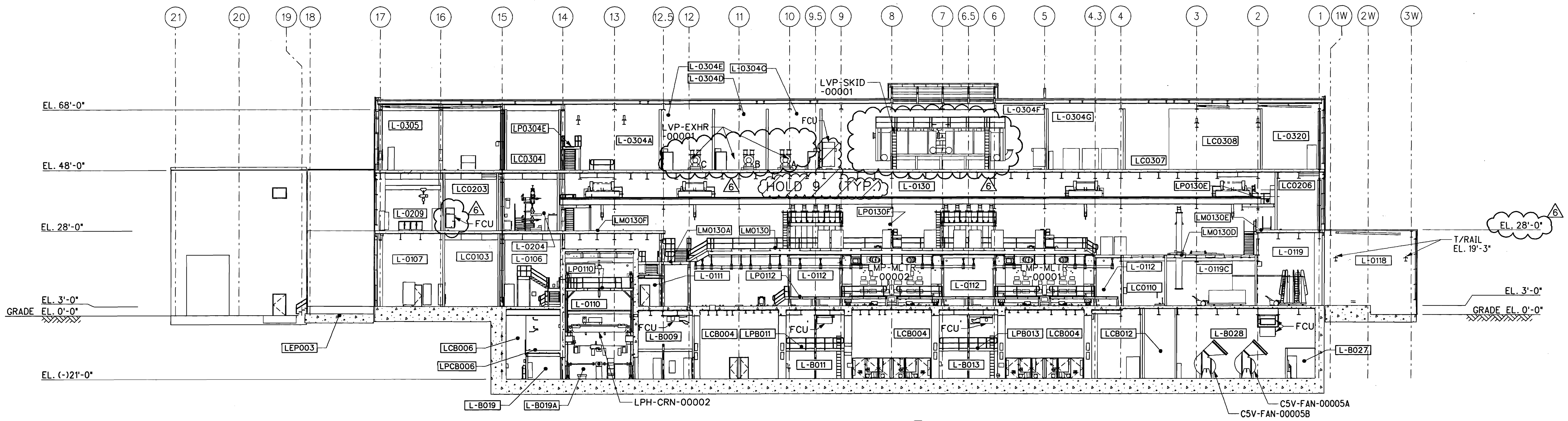
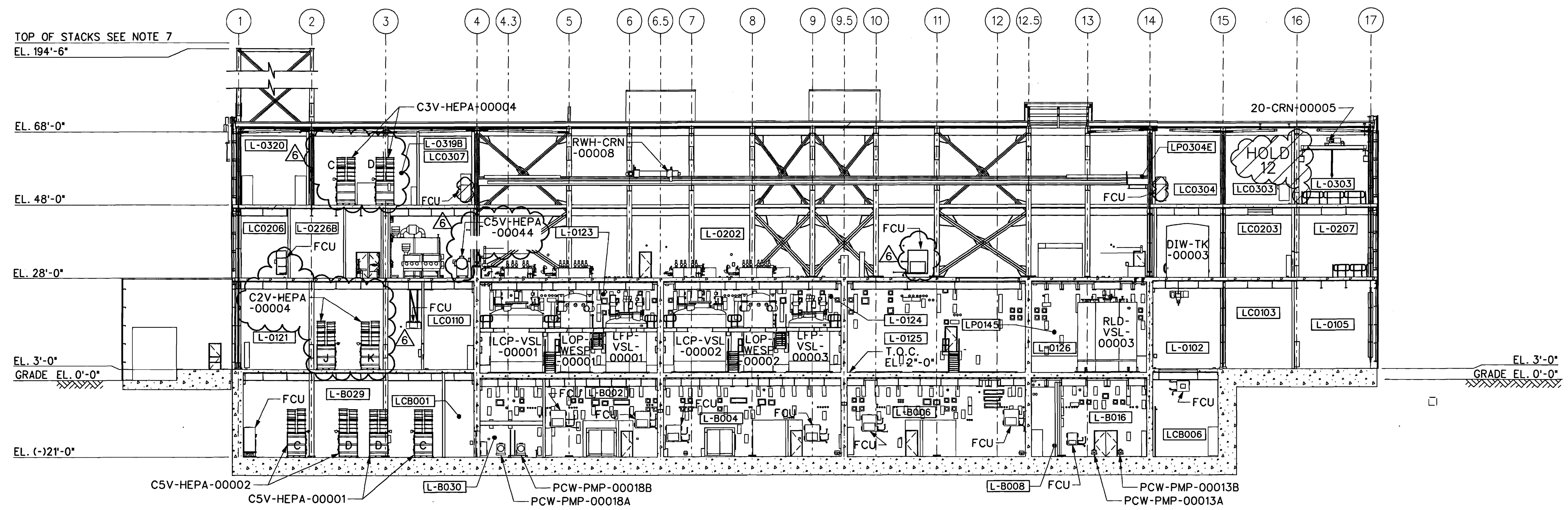
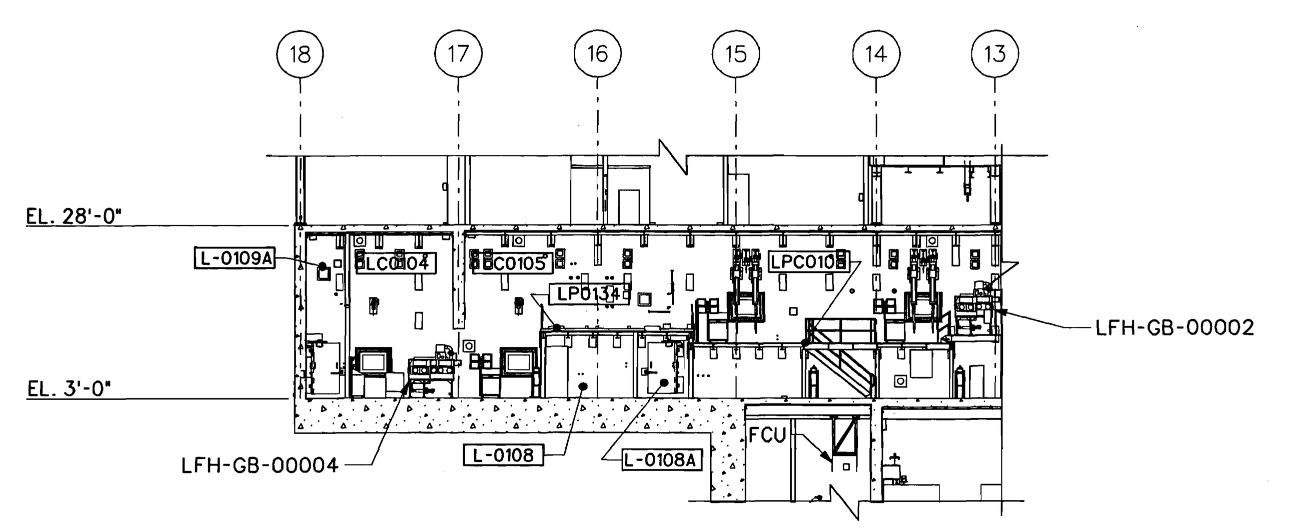
FORM E_SDN.DGN 02/2003



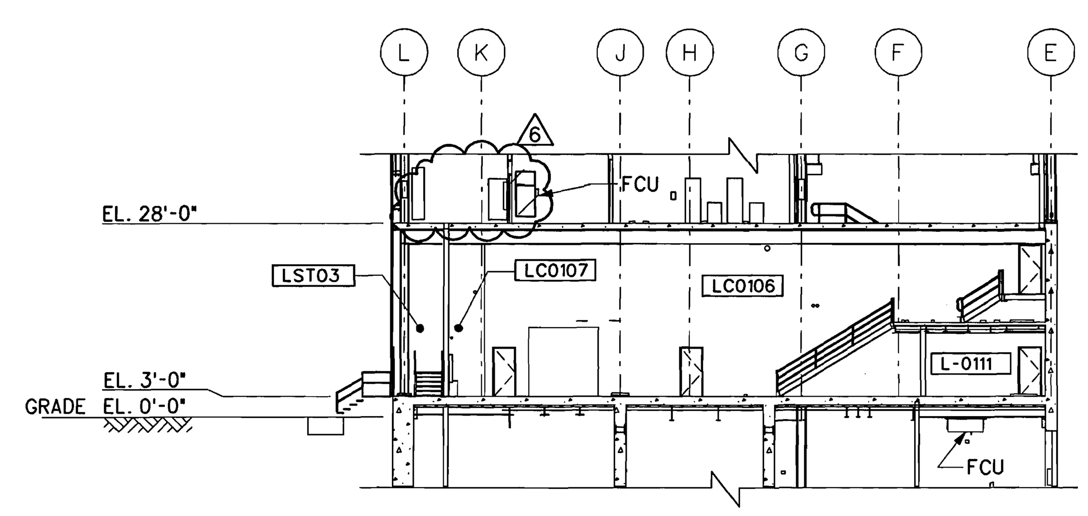
SECTION N
P1-P01T-00001 THRU 00006



SECTION P
P1-P01T-00001 THRU 00006



SECTION R
P1-P01T-00002



SECTION U
P1-P01T-00002

NOTES:

1. FOR GENERAL NOTES, SEE 24590-LAW-P1-P01T-00001.
2. FOR INCORPORATED DESIGN CHANGE DESCRIPTIONS, SEE DRAWINGS 24590-LAW-P1-P01T-00003 REV. 1, NOTE 4.
3. ADR'S FOR ELEVATIONS ARE AS FOLLOWED:
   24590-LAW-ADR-PL-02-003, REV. 1 FOR ELEVATION (-)21'-0"
   24590-LAW-ADR-PL-02-002, REV. 0 FOR ELEVATION 3'-0"
   24590-LAW-ADR-PL-03-005, REV. 0 FOR ELEVATION 22'-0"
   24590-LAW-ADR-PL-03-001, REV. 2 FOR ELEVATION 28'-0"
   24590-LAW-ADR-PL-03-006, REV. 0 FOR ELEVATION 48'-0"
   24590-LAW-ADR-PL-03-007, REV. 1 FOR ELEVATION 68'-0"
4. CONTENTS OF THIS DOCUMENT ARE DANGEROUS WASTE PERMIT AFFECTING.
5. ADDED HOLD NOTES 8, 9, 10 AND 11, ADDED ROOMS L-0304C/D/E AND RENUMBERED L-304E TO L-0304A.
6. REVISED CCB PLATFORMS (L-0130)
   REVISED CCB IMPORT STATION (LM0130D)
   ADDED CONSUMABLE CARTS (L-0119 AND L-0119C)
   REVISED FINISH LINE GLOVE BOXES LFH-GB-00002 ADN LFH-GB-00004
   REVISED LOI CABINETS
   REVISED NOTE 5

   REVISED TO REISSUE (-) 21'-0", 3'-0", 22'-0" ELEVATIONS, RELEASED HOLDS 2,3, AND 11, REVISED HOLDS 6,9, AND 10, FINALIZED FCU LOCATIONS FOR (-) 21'-0" EL., (+) 3'-0" EL. AND (+) 22'-0" EL.

   RELEASED HOLD 6, AND 7, FINALIZED 68'-0" ELEVATION, ADDED NOTE 7, MODIFIED HOLD 8, 9, 10, AND NOTE 3, REVISED SECTION CALLOUTS N AND P.

   6 RELEASED HOLD 8, AND 10, MODIFIED HOLD 9 TO RELEASE EL. 28' FCU'S FROM HOLD.
7. TOP OF STACK ELEVATIONS:
   C2 HVAC EXHAUST - 105'-0"
   C3 HVAC EXHAUST - 198'-6"
   C5 HVAC EXHAUST - 198'-6"
   LVP SECONDARY OFFGAS - 198'-6"

HOLDS:

1. DELETED
2. DELETED
3. DELETED
4. DELETED
5. DELETED
6. DELETED
7. DELETED
8. DELETED
9. FAN COIL UNITS SIZING AND LOCATION PENDING VENDOR SELECTION FOR ELEVATION 48' TO BE PROVIDED BY LAW HVAC ENGINEERING.
10. DELETED
11. DELETED
12. WALL PENDING EVALUATION OF OPERATIONAL REQUIREMENTS.

REV	DESCRIPTION	ORG	CHKD	RVWD	APVD	DATE
6	REVISED TO INCORPORATE CHANGES IN NOTE 6	DLL	CMS	PR	DJ	12/19/05
5	REVISED TO INCORPORATE CHANGES IN NOTE 6	DLL	CMS	PR	DJ	11/16/05
4	REVISED TO INCORPORATE CHANGES IN NOTE 6	DLL	CMS	PR	KK	2/8/05
0	ISSUED FOR DESIGN	CS	AH	RM	CW	6/2/03

REVISION HISTORY

ISSUED BY RPP-WTP PDC
ISSUE STAMP

PROJECT No.	24590
SITE	HANFORD
AREA	200E
BUILDING No.	20

RIVER PROTECTION PROJECT
WASTE TREATMENT PLANT
2435 STEVENS CENTER PLACE
RICHLAND, WA 99354

CONTRACT No: DE-AC27-01RV14136

	BY	DATE
ORIGINATOR	SALERNO, CRAIG	6/2/03
CHECKER	HARSHFIELD, ALAN	6/2/03
APPROVER	WINKLER, CLIFFORD	6/2/03
REVIEWER	MOSSBRUCKER, ROBERT	6/2/03

LAW VITRIFICATION BUILDING GENERAL ARRANGEMENT SECTION N-N, P-P, R-R AND U-U

CONTENT APPLICABLE TO ALARA? [X] YES [ ] NO
ADR NO. SEE NOTE 3 REV:
SAFETY SCREEN REQUIRED? [ ] YES [X] NO E&NS INITIAL IF YES

SCALE: 1/16"=1'-0"
24590-LAW-P1-P01T-00011
REV 6

SAFETY SCREEN IS REQUIRED FOR DRAWING TYPES IDENTIFIED IN 24590-WTP-GPP-SREG-002
'E' SIZE - 44x34
COMPUTER GENERATED - MANUAL CHANGES NOT PERMITTED
R10594616
12/19/2005 01:33:27 PM
PLOTTED BY: arfuller
C:\Work\dms06392\24590LAWP1P01T00011.DGN
FORM E_SDN.DGN 02/2003

Attachment 51 – Appendix 9.5
Low Activity Waste Building
Civil, Structural, and Architectural Criteria and Typical Design Details

Where information regarding treatment, management, and disposal of the radioactive source, byproduct material, and/or special nuclear components of mixed waste (as defined by the Atomic Energy Act of 1954, as amended) has been incorporated into this permit, it is not incorporated for the purpose of regulating the radiation hazards of such components under the authority of this permit and chapter 70.105 RCW. In the event of any conflict between Permit Condition III.10.A. and any statement relating to the regulation of source, special nuclear, and byproduct material contained in portions of the permit application that are incorporated into this permit, Permit Condition III.10.A. will prevail.

Additional appendices will be added to this appendix as new information is incorporated into this permit.

Drawings and Documents

Attachment 51 – Appendix 9.5

Low Activity Waste Building
Civil, Structural, and Architectural Criteria and Typical Design Details

The following drawings have been incorporated into Appendix 9.5 and can be viewed at the Ecology Richland Office. **New drawings are in bold lettering.**

Drawing /Document Number	**Description**
24590-LAW-PER-M-02-001, Rev 4	LAW Facility Sump Data
RESERVED	RESERVED

ISSUED BY
RPP-WTP PDC

R10552771

Document title: **LAW Facility Sump Data**

Contract number: DE-AC27-01RV14136

Department: Mechanical Systems

Author(s): P S. Holgado

Principal author signature:

Document number: 24590-LAW-PER-M-02-001, Rev. 4

Checked by: M. Sanvictores

Checker signature:

Date of issue: 4/21/05

Issue status: Issued for Permitting Use

Approved by: Janet Roth

Approver's position: LBL Project Engineering Manager

Approver signature:

MACARIO C. SANVICTORES
STATE OF WASHINGTON
29255
REGISTERED
PROFESSIONAL ENGINEER
EXPIRES 09/21/05

4/21/05

This bound document contains a total of 10 sheets

Notice

Please note that source, special nuclear, and byproduct materials, as defined in the Atomic Energy Act of 1954 (AEA), are regulated at the US Department of Energy (DOE) facilities exclusively by DOE acting pursuant to its AEA authority. DOE asserts, that pursuant to the AEA, it has sole and exclusive responsibility and authority to regulate source, special nuclear, and byproduct materials at DOE-owned nuclear facilities. Information contained herein on radionuclides is provided for process description purposes only.

History Sheet

Rev	Date	Reason for revision	Revised by
0	7/16/02	Issued for permitting use	P.S. Holgado
1	8/27/02	Added statement regarding location of sumps	P.S. Holgado
2	9/19/02	Added Table 2	P.S. Holgado
3	3/19/03	Major revision, issued for permitting use.	P. S. Holgado
4	4/21/05	Revised for permitting use.	P. S. Holgado

Contents

Tables

1 Introduction

The Washington Administrative Code, WAC 173-303, requires the use of secondary containment for systems managing dangerous waste. This document provides a brief description of the secondary containment sumps regulated under the Dangerous Waste Permit that are located at elevation −21 ft and elevation +3 ft of the Low-Activity Waste (LAW) Vitrification Facility. Detailed information about these sumps is included in Table 1. Effluent streams that drain into these sumps are listed in Table 2.

2 Applicable Documents

WAC 173-303. *Dangerous Waste Regulations.* Washington Administrative Code.

3 Description

3.1 Elevation −21 Ft Sumps

3.1.1 C3/C5 Drains/Sump Collection Vessel RLD-VSL-00004 Cell Sump

The C3/C5 Drains/Sump Collection Vessel cell sump (RLD-SUMP-00028) is in a C5 area at elevation −21 ft. It is a dry sump, approximately 24 inches in diameter and 30 inches deep, and is equipped with liquid level detection and alarm. Any overflow from the C3/C5 Drains/Sump Collection vessel (RLD-VSL-00004) flows to this sump. Any material collecting in the sump can be transferred within 24 twenty four hours to the Plant Wash Vessel (RLD-VSL-00003) at el. +3 ft. using permanently installed electric submersible sump pumps. Sump waste that is transferred to the Plant Wash Vessel (RLD-VSL-00003) is eventually transferred to the Pretreatment Facility for processing.

3.2 Elevation +3 Ft Sumps

At elevation +3 ft, there are eight sumps, all dry sumps. The two sumps RLD-SUMP-00033 and RLD-SUMP-00034 located in the process cell (Room L-0125) assigned to the third Melter are not regulated and do not have permanently installed sump pumps and liquid level detectors. The rest of the sumps are provided with liquid level detection and alarm and permanently installed electric submersible sump pump. The pump transfers the sump contents to the Plant Wash Vessel (RLD-VSL-00003) located at the same elevation.

3.2.1 Process Cell Sumps

The melter feed system vessels and the primary offgas equipment for the two (2) LAW melters are located in two (2) lined process cells in the LAW Vitrification building. Each process cell contains the vessels and primary offgas equipment for a single LAW melter.

Process Cell for Melter 1, Room L-0123

LCP-VSL-00001	Concentrate Receipt Vessel
LFP-VSL-00001	Melter 1 Feed Preparation Vessel
LFP-VSL-00002	Melter 1 Feed Vessel
LOP-SCB-00001	Melter 1 Submerged Bed Scrubber (SBS)
LOP-WESP-00001	Melter 1 Wet Electrostatic Precipitator
LOP-VSL-00001	Melter 1 SBS Condensate Vessel

Process Cell for Melter 2, Room L-0124

LCP-VSL-00002	Concentrate Receipt Vessel
LFP-VSL-00003	Melter 2 Feed Preparation Vessel
LFP-VSL-00004	Melter 2 Feed Vessel
LOP-SCB-00002	Melter 2 Submerged Bed Scrubber
LOP-WESP-00002	Melter 2 Wet Electrostatic Precipitator
LOP-VSL-00002	Melter 2 SBS Condensate Vessel

Process Cell for Melter 3, Room L-0125

NONE

Each process cell is equipped with two sumps. The floor of the cell is sloped to drain potential spillage to a sump at the base of the east wall or west wall.

Water can be introduced into the sumps if needed for flushing.

Any material collecting in the process cell sumps can be transferred within twenty four hours to the Plant Wash Vessel (RLD-VSL-00003) using permanently installed electric submersible sump pumps.

Each sump is 15 inches deep by 30 inches in diameter, and is equipped with liquid level detection and liquid level alarm. Sump waste transferred to the Plant Wash Vessel (RLD-VSL-00003) is eventually transferred to the Pretreatment Facility for processing.

3.2.2 Effluent Cell Sumps

The Plant Wash Vessel (RLD-VSL-00003) and the SBS Condensate Collection Vessel (RLD-VSL-00005) are located in the effluent cell, room L-0126. The effluent cell is provided with two sumps, one in the west end and another in the east end. Any material collected in the effluent cell sump can be transferred to the Plant Wash Vessel (RLD-VSL-00003) within twenty four hours, using permanently installed electric submersible sump pumps.

Each sump is 15 inches deep by 30 inches in diameter, and is equipped with liquid level detection and liquid level alarm. Sump waste transferred to the Plant Wash Vessel (RLD-VSL-00003) is eventually transferred to the Pretreatment Facility for processing.

Table 1 - LAW Regulated Sumps

Sump Number	LAW Room Number & Elevation	Maximum Sump Capacity, Gal	Sump Type	Sump Dimensions, Inch	Piping and Instrumentation Diagram Number 24590-LAW-M6-	Leak Detection Type	Sump Material of Fabrication
RLD-SUMP-00028	L-B001B C3/C5 Drains/Sump Collection Vessel Cell Elev. −21 ft	59	Dry Sump	24 in. Diam x 30 in. Deep	RLD-P0002	Radar	UNS NO8367 (AL-6XN)
RLD-SUMP-00029	L-0123 Process Cell West End Elev. +3 ft	46	Dry Sump	30 in. Diam x 15 in. Deep	RLD-P0003	Radar	UNS NO8367 (AL-6XN)
RLD-SUMP-00030	L-0123 Process Cell East End Elev. +3 ft	46	Dry Sump	30 in. Diam x 15 in. Deep	RLD-P0003	Radar	UNS NO8367 (AL-6XN)
RLD-SUMP-00031	L-0124 Process Cell Sump West End Elev. +3 ft	46	Dry Sump	30 in. Diam x 15 in. Deep	RLD-P0003	Radar	UNS NO8367 (AL-6XN)
RLD-SUMP-00032	L-0124 Process Cell Sump East End Elev. +3 ft	46	Dry Sump	30 in. Diam x 15 in. Deep	RLD-P0003	Radar	UNS NO8367 (AL-6XN)

Table 1 - LAW Regulated Sumps

Sump Number	LAW Room Number & Elevation	Maximum Sump Capacity, Gal	Sump Type	Sump Dimensions, Inch	Piping and Instrumentation Diagram Number 24590-LAW-M6-	Leak Detection Type	Sump Material of Fabrication
RLD-SUMP-00035	L-0126 Effluent Cell West End Elev. +3 ft	46	Dry Sump	30 in. Diam x 15 in. Deep	RLD-P0003	Radar	UNS NO8367 (AL-6XN)
RLD-SUMP-00036	L-0126 Effluent Cell East End Elev. +3 ft	46	Dry Sump	30 in. Diam x 15 in. Deep	RLD-P0003	Radar	UNS NO8367 (AL-6XN)

Table 2 - Drains to LAW Sumps

Drain	Sump, LAW Room Number & Elevation	Maximum Flow Capacity, gal/min	Drain Type/ Nominal Operating Volume, Gal	Drain Line Size (Pipe Diameter), Inch	Piping and Instrumentation Diagram Number 24590-LAW-M6-	Pipe Material of Fabrication
• Pump Bulge RLD-BULGE-00001 Drain • Double-Walled Piping Outer Containment Drains • RLD-VSL-00004 Overflow	RLD-SUMP-00028 L-B001B C3/C5 Drains/Sump Collection Vessel Cell Elev. −21 ft	60 30 425	N/A	2 1 8	RLD-P0002	316L SS 316L SS 6 Moly
• Primary Offgas (LOP) Melter 1 Valve Bulge Drain • LCP-BULGE-00001/2 Drain	RLD-SUMP-00029 L-0123 Process Cell West End Sump Elev. +3 ft	60 60	N/A	2 2	LOP-P0001	6 Moly 316L SS
• Melter Feed Detection Box Leak • Melter 1 Feed Prep/Feed Vessel Valve Bulge Drain	RLD-SUMP-00030 L-0123 Process Cell East End Sump Elev. +3 ft	30 60	N/A	1 2	RLD-P0003 LFP-P0001	316L SS 316L SS
• Primary Offgas (LOP) Melter 2 Valve Bulge Drain • LCP-Bulge-00003 Drain	RLD-SUMP-00031 L-0124 Process Cell West End Sump Elev. +3 ft	30 60	N/A	2 2	LOP-P0002 LCP-P0002	6 Moly 316L SS

Table 2 - Drains to LAW Sumps

Drain	Sump, LAW Room Number & Elevation	Maximum Flow Capacity, gal/min	Drain Type/ Nominal Operating Volume, Gal	Drain Line Size (Pipe Diameter), Inch	Piping and Instrumentation Diagram Number 24590-LAW-M6-	Pipe Material of Fabrication
• Melter Feed Detection Box Leak • Melter 2 Feed Prep/Feed Vessel Valve Bulge Drain	RLD-SUMP-00032 L-0124 Process Cell East End Sump Elev. +3 ft	30 60	N/A	1 2	LFP-P0003	316L SS 316L SS
None	RLD-SUMP-00035 L-0126 Effluent Cell West End Sump Elev. +3 ft	N/A	N/A	N/A	N/A	N/A
• Plant Wash Vessel/SBS Condensate Collection Vessel Valve Bulge Drain	RLD-SUMP-00036 L-0126 Effluent Cell East End Sump Elev. +3 ft	60	N/A	2	RLD-P0001	6 Moly

Attachment 51 – Appendix 9.6
Low Activity Waste Building
Mechanical Drawings

Where information regarding treatment, management, and disposal of the radioactive source, byproduct material, and/or special nuclear components of mixed waste (as defined by the Atomic Energy Act of 1954, as amended) has been incorporated into this permit, it is not incorporated for the purpose of regulating the radiation hazards of such components under the authority of this permit and chapter 70.105 RCW. In the event of any conflict between Permit Condition III.10.A. and any statement relating to the regulation of source, special nuclear, and byproduct material contained in portions of the permit application that are incorporated into this permit, Permit Condition III.10.A. will prevail.

Additional appendices will be added to this appendix as new information is incorporated into this permit.

Drawings and Documents

Attachment 51 – Appendix 9.6
Low Activity Waste Building
Mechanical Drawings

The following drawings have been incorporated into Appendix 9.6 and can be viewed at the Ecology Richland Office. **New drawings are in bold lettering**.

Drawing/Document Number	Description
24590-LAW-MKD-LOP-P0008, Rev 0	Mechanical Data Sheet for LOP-SCB-00001/2
24590-LAW-MK-LOP-P0001001, Rev 0	Equipment Assembly Drawing for LOP-SCB-00001/2, Sheet 1 of 3
24590-LAW-MK-LOP-P0001002, Rev 0	Equipment Assembly Drawing for LOP-SCB-00001/2, Sheet 2 of 3
24590-LAW-MK-LOP-P0001003, Rev 0	Equipment Assembly Mechanical Drawing for LOP-SCB-00001/2, Sheet 3 of 3
24590-LAW-MTD-LVP-P0001, Rev 0	Mechanical Data Sheet for LVP-TK-00001
24590-LAW-MT-LVP-P0004, Rev 0	Equipment Assembly Drawing for LVP-TK-00001
24590-LAW-MVD-LCP-P0004, Rev 1	Mechanical Data Sheet for LCP-VSL-00001
24590-LAW-MVD-LCP-P0005, Rev 1	Mechanical Data Sheet for LCP-VSL-00002
24590-LAW-MVD-LFP-P0007, Rev 1	Mechanical Data Sheet for LFP-VSL-00002
24590-LAW-MVD-LFP-P0008, Rev 1	Mechanical Data Sheet for LFP-VSL-00004
24590-LAW-MVD-LFP-P0010, Rev 1	Mechanical Data Sheet for LFP-VSL-00001
24590-LAW-MVD-LFP-P0011, Rev 1	Mechanical Data Sheet for LFP-VSL-00003
24590-LAW-MVD-LOP-P0004, Rev 1	Mechanical Data Sheet for LOP-VSL-00001
24590-LAW-MVD-LOP-P0005, Rev 1	Mechanical Data Sheet for LOP-VSL-00002
24590-LAW-MVD-RLD-P0001, Rev 1	Mechanical Data Sheet for RLD-VSL-00004
24590-LAW-MVD-RLD-P0006, Rev 2	Mechanical Data Sheet for RLD-VSL-00005
24590-LAW-MVD-RLD-P0007, Rev 2	Mechanical Data Sheet for RLD-VSL-00003
24590-LAW-MV-LCP-P0001, Rev 0	Equipment Assembly Drawing for LCP-VSL-00001
24590-LAW-MV-LCP-P0002, Rev 0	Equipment Assembly Drawing for LCP-VSL-00002
24590-LAW-MV-LFP-P0001, Rev 0	Equipment Assembly Drawing for LFP-VSL-00002
24590-LAW-MV-LFP-P0002, Rev 0	Equipment Assembly Drawing for LFP-VSL-00004
24590-LAW-MV-LFP-P0004, Rev 0	Equipment Assembly Drawing for LFP-VSL-00001
24590-LAW-MV-LFP-P0005, Rev 0	Equipment Assembly Drawing for LFP-VSL-00003
24590-LAW-MV-LOP-P0001, Rev 0	Equipment Assembly Drawing for LOP-VSL-00001
24590-LAW-MV-LOP-P0002, Rev 0	Equipment Assembly Drawing for LOP-VSL-00002
24590-LAW-MV-RLD-P0001, Rev 2	Equipment Assembly Drawing for RLD-VSL-00004
24590-LAW-MV-RLD-P0002, Rev 1	Equipment Assembly Drawing for RLD-VSL-00003
24590-LAW-MV-RLD-P0003, Rev 1	Equipment Assembly Drawing for RLD-VSL-00005
RESERVED	RESERVED

R10206349

MECHANICAL DATA SHEET: VESSEL

PLANT ITEM No.

24590-LAW-MK-LOP-SCB-00001, 24590-LAW-MK-LOP-SCB-00002

Project:	*RPP-WTP*	P&ID:	*24590-LAW-M6-LOP-P0001, P0002*
Project No:	*24590*	Process Data Sheet:	*24590-LAW-MKD-LOP-00002, 00004*
Project Site:	*Hanford*	Vessel Drawing	*24590-LAW-MK-LOP-P0001001, 002, 003*
Description:	*MELTER 1, 2 Submerged Bed Scrubber*		

Reference Data

Charge Vessels (Tag Numbers)	*None*
Pulsejet Mixers / Agitators (Tag Numbers)	*None*
RFDs/Pumps (Tag Numbers)	*None*

Design Data

Quality Level		*QL-1*	Fabrication Specs	*24590-WTP-3PS-MV00-TP001*		
Seismic Category		*SC – 3*	Design Code	*ASME VIII Div 1*		
Service/Contents		*Radioactive liquid*	Code Stamp	*Yes*		
Design Specific Gravity		*1.1*	NB Registration	*Yes*		
Maximum Operating Volume	gal	*3,690*	Weights (lbs)	Empty	Operating	Test
Total Volume	gal	*4,948*	Estimated	*37,300*	*78,800*	*82,500*
			Actual *			

Inside Diameter	inch	*120*			Wind Design		*N/A*
Length/Height (TL-TL)	inch	*78*			Snow Design		*N/A*
		Vessel Operating	Vessel Design	Coil/Jacket Design	Seismic Design		*24590-WTP-3PS-MV00-TP002* *24590-WTP-3PS-FB01-TP001*
Internal Pressure	psig	*ATM*	*15*	*125 (Note 2)*	Seismic Base Moment *	ft*lb	
External Pressure	psig	*3.6*	*FV*	*-*	Postweld Heat Treat		*Not Required*
Temperature	°F	*212 (Note 6)*	*237 (Note 7)*	*237 (Note 2)*	Corrosion Allowance	Inch	*(Note 8)*
Min. Design Metal Temp.	°F	*41*			Hydrostatic Test Pressure *	psig	

Note: Please note that source, special nuclear and byproduct materials, as defined in the Atomic Energy Act of 1954 (AEA), are regulated at the U.S. Department of Energy (DOE) facilities exclusively by DOE acting pursuant to its AEA authority. DOE asserts, that pursuant to the AEA, it has sole and exclusive responsibility and authority to regulate source, special nuclear, and byproduct materials at DOE owned nuclear facilities. Information contained herein on radionuclides is provided for process description purposes only.

ISSUED BY RPP-WTP PDC
INIT 2-3-04 DATE

MARK W. HOFFMANN
STATE OF WASHINGTON
0030952
REGISTERED PROFESSIONAL ENGINEER
1/30/04
EXPIRES 12/10/04

This Bound Document Contains a total of 4 pages.

0	1/30/04	Issued for Permitting Use				
REV	DATE	REASON FOR REVISION	PREPARER	CHECKER	REVIEWER	APPROVER

Materials of Construction

Component	Material	Minimum Thickness / Size	Containment
Top Head	***SB575 N06022***	***See Drawing***	***Auxiliary***
Shell	***SB575 N06022***	***See Drawing***	***Primary***
Bottom Head	***SB575 N06022***	***See Drawing***	***Primary***
Support	***SA240 304 (Notes 5)***	***See Drawing***	***N/A***
Internal Coils/Half-Pipe Coils	***SB622 N06022/ SA312 304(Note 5)***	***See Drawing***	***N/A***
Internals	***SB575 N06022 / SB622 N06022 (Note 9)***	***See Drawing***	***Thermowell Primary***
Pipe	***SB622/SB619 N06022 SB575 N06022 (Note 10)***	***See Drawing***	***Note 4***
Forgings/ Bar stock	***SB564 N06022***	***See Drawing***	***N/A***
Gaskets	***EPDM / Garlock Helicoflex***	***N/A***	***N/A***
Bolting	***SA193 Grade B16***	***N/A***	***N/A***

Miscellaneous Data

Orientation	***Vertical***	Support Type	***Skirt***
Insulation Function	***N/A***	Insulation Material	***None***
Insulation Thickness (inch)	***N/A***	Internal Finish	***Welds descaled as laid.***
		External Finish	***Shell welds under half pipe coils to be ground smooth. Others descaled as laid.***

Remarks

**** To be determined by the vendor.***
***** Refer to Note 6.***
****** Refer to Note 7.***

Note 1 : ***This vessel has an internal removable bed or column. This bed has different operating characteristics than the vessel and is noted in the localized features section on sheet 2.***

Note 2 : ***The coil operating conditions are 90 psig and 50° F.***

Note 3 : ***The bed packing material is ceramic spheres 1" dia and weigh 115 lb/ft^3.***

Note 4 : ***Nozzle necks below the high operating liquid level are primary, the others are auxiliary.***

Note 5 : ***SA240 304 & SA312 304 stainless steel material shall have carbon content of 0.030% maximum. Non welded items are excluded from this requirement.***

Note 6 : ***The vessel normally operates at 140 °F, however, operating fluctuations can allow it to reach 212 °F.***

Note 7 : ***To consider upset condition, the top head cover & top head flange shall be designed to 1250 °F & 400 °F respectively.***

Note 8 : ***Corrosion allowance for surfaces exposed to process liquid shall be 0.04". Corrosion allowance of 0.04" shall be applied to stainless steel surfaces exposed to cooling coil fluid. If exposed surfaces to cooling coil fluid is vessel alloy material, corrosion allowance of 0.01" shall be applied.***

Note 9 : ***Internal fasteners shall be of alloy N06022 material.***

Note 10 : ***SB575 N06022 material allowed for 4" and 6" nozzles rolled from plate to meet wall thickness requirements. Full RT inspection mandatory***

Equipment Cyclic Data Sheet

Component Plant Item Number:	
Component Description	***Vessel***

The information below is provisional and envelopes operational duty for fatigue assessment. It is not to be used as operational data.

Materials of Construction	***SB575 N06022 (Hastelloy C –22)***

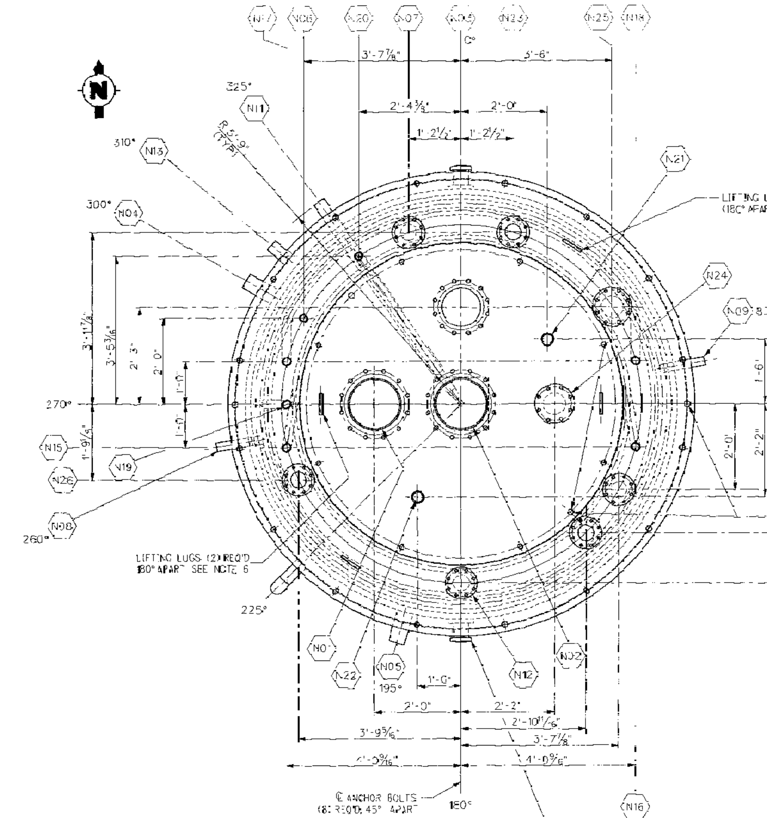
Design Life	40 years
Component Function and Life Cycle Description	The SBS is a semi-passive device designed for aqueous scrubbing of entrained radioactive particulate from the melter offgas. It also serves to cool and condense the melter vapor emissions. Melter offgas is nominally cooled from 392 deg. F while feeding (from 752 deg. F when idled) to 122 deg. F. Operation within and between these two modes are the predominate conditions the vessel will encounter. Design parameters for the cooling coils is to cool the offgas from 392 deg. F to a maximum of 140 deg. F. Occasional process upsets will direct undiluted offgas to the SBS at temperatures near 1250 deg. F., where the SBS will cool the gasses to 140 deg. F. Non-routine, or heavy maintenance would include the change out of a Vitrification Melter or other heavy non-routine maintenance requiring manned entry to the wet process cell. This is expected to occur annually. During heavy maintenance, the SBS would be isolated and allowed to remain at ambient temperature or approximately 41 to 100 deg. F.

Load Type		Min	Max	Number of Cycles	Comment
Design Pressure	psig	FV	15	8	Nominal Assumption
Operating Pressure	psig	-2.2	0	40	Bed min. -0 .36, max. 0. Assume an annual shutdown (40 cycles/lifetime).
Operating Temperature	°F	104	140	Infinite	Normal operating range.
Contents Specific Gravity		1	1.1	40	Nominal operating is 1.1, assume annual flush out and replace with clean water.
Contents Level	inch	Empty	63	120	Nominal operating is 63 inch from datum, assume annual 3x flush out and replace with clean water.
Localized Features		Temperature Range (^{0}F)		Number of Cycles / Comment	
Nozzle (N2) & Top Head Cover		41 / 392 / 752 / 1250		Assume normal mode is feeding (392), with 40 cycles to upset (1250) and back to idle (752). Assume normal mode is feeding (392) with 2100 cycles to idle (752) and back to feeding. Assume mode is idle (752) with 40 cycle of trip to upset (1250), and return to idle (752). Assume mode is idle (752) with 40 cycle to off (41) and back to idle (752).	
Nozzle (N1)		41 / 70 / 1250		Assume normal mode is feeding (70), with 40 cycles to upset (1250) and back to idle (70). [Unplanned activations] Assume mode is idle (70) with 2100 cycle of trip to upset (1250), and return to idle (70). [Weekly surveillance tests] Assume mode is idle (70) with 40 cycle to off (41) and back to idle (70).	
Cooling Supply / Returns		41 in, 68 out		Nominally, temperature is 41 in, 68 out. Assume annual cooling outage, in=out=ambient=70 (40 cycles). Assume annual cooling supply failure/isolation during operation, in=out=212 (40 cycles).	
Internal Bed		41 / 140		Assume 40 cycles from running (140), to off (41), then resume (140).	

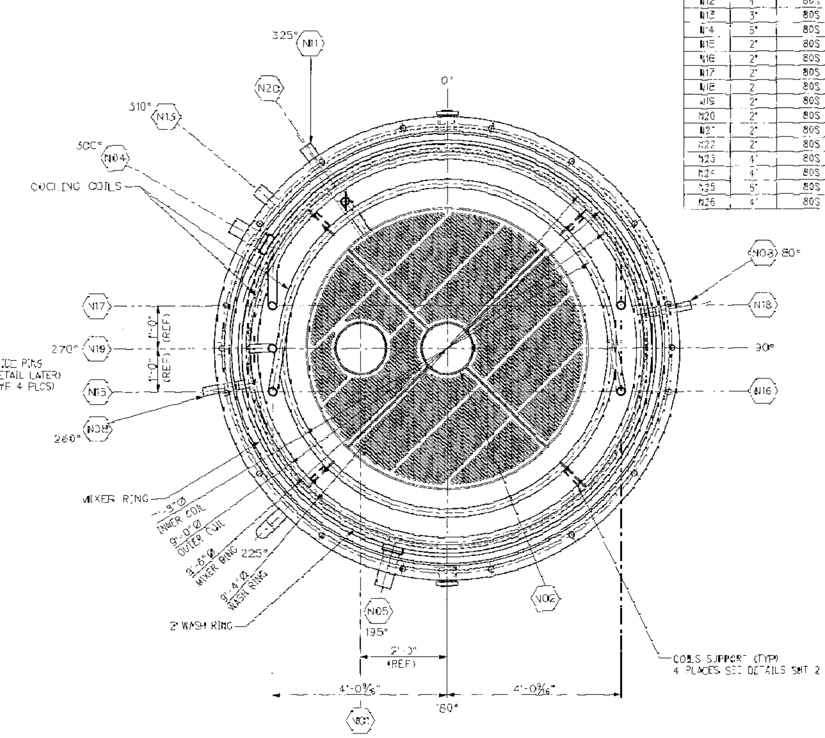
Notes

- ***Cycle increase: The Seller must increase the numbers of operational cycles given above by 10% to account for commissioning duty unless otherwise noted.***
- ***The seller shall consider the conditions of nozzles N1 and N2 happening coincidentally.***

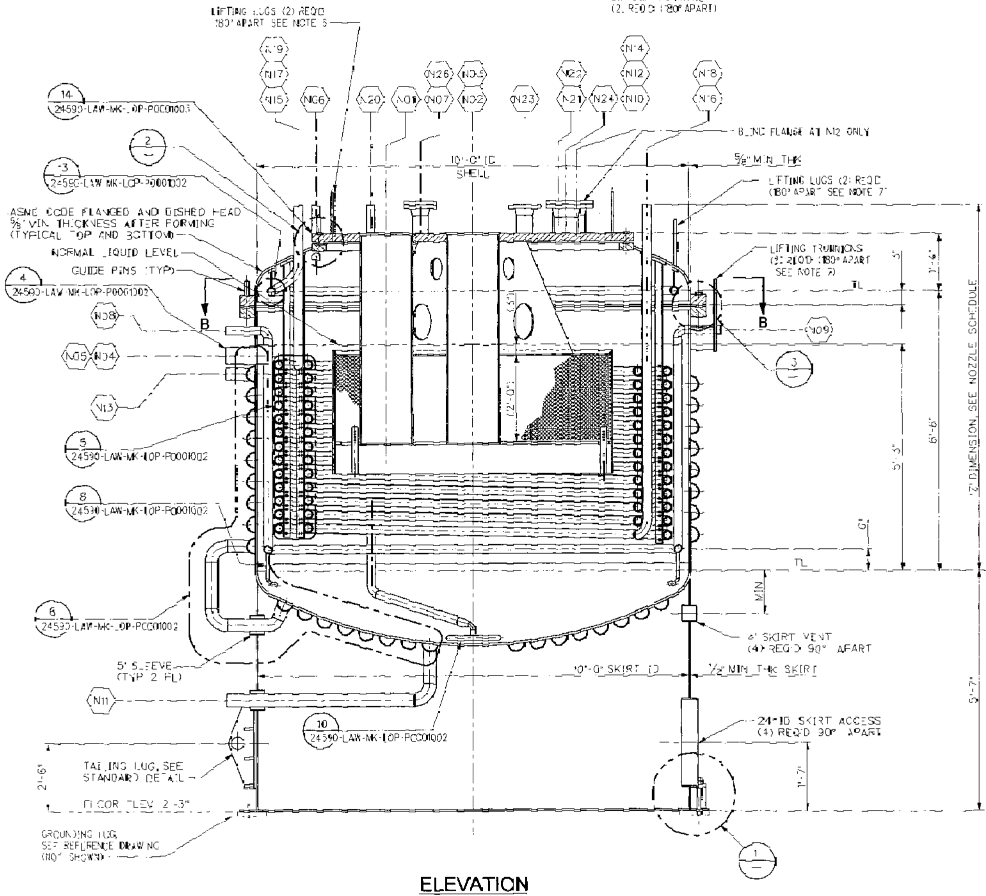
NOZZLE	SIZE	SCH/WALL	SERVICE/REMARKS	"Z" DIM	[illegible]	CONN PIPE SIZE SCHED
N01	*	0.375"	INLET	7'-10"	SEE DETAIL 14, SHT 3 OF 3	NA
N02	*	0.375"	INLET	[illegible]	SEE DETAIL 11, SHT 3 OF 3	NA
N03	10"		OUTLET	[illegible]	SEE DETAIL 14, SHT 3 OF 3	NA
N04	4"	80S	OVERFLOW	5'-0"	SEE DETAIL 4, SHT 2 OF 3	4"-40S
N05	4"	80S	OVERFLOW	5'-0"	SEE DETAIL 4, SHT 2 OF 3	4"-40S
N06	2"	80S	VENT	8'-8"	24590-WTP-MV-M59T-00015001, DET 1	2"-40S
N07	4"	80S	SPARE	8'-8"	24590-WTP-MV-M59T-00015001, DET 9	BLIND
N08	2"	80S	PRIMARY MIXER	5'-8"	SEE ELEVATION	2"-40S
N09	2"	80S	PRIMARY MIXER	5'-8"	SEE ELEVATION	2"-40S
N10	6"	80S	LEVEL DETECTION	8'-8"	24590-WTP-MV-M59T-00015001 DET 9	NA
N11	3"	80S	COOLING WATER JACKET IN	(-) 3'-0"	SEE ELEVATION	3"-40S
N12	4"	80S	SPARE	8'-8"	24590-WTP-MV-M59T-00015001 DET 9	BLIND
N13	3"	80S	COOLING WATER JACKET OUT	4'-0"	SEE ELEVATION	3"-40S
N14	6"	80S	LEVEL DETECTION	8'-8"	24590-WTP-MV-M59T-00015001, DET 9	NA
N15	2"	80S	COOLING WATER (COIL OUT)	8'-8"	24590-WTP-MV-M59T-00015001, DET 3	2"-40S
N16	2"	80S	COOLING WATER (COIL IN)	8'-8"	24590-WTP-MV-M59T-00015001, DET 3	2"-40S
N17	2"	80S	COOLING WATER (COIL OUT)	8'-8"	24590-WTP-MV-M59T-00015001, DET 3	2"-40S
N18	2	80S	COOLING WATER (COIL IN)	8'-8"	24590-WTP-MV-M59T-00015001, DET 3	2"-40S
N19	2"	80S	INLET TO WASH RING	8'-8"	24590-WTP-MV-M59T-00015001, DET 3	2"-40S
N20	2"	80S	LIQUID/SOLIDS REMOVAL	8'-8"	24590-WTP-MV-M59T-00015001, DET 3	2"-40S
N21	2"	80S	SPARE	8'-8"	24590-WTP-MV-M59T-00015001, DET 2	2"-40S
N22	2"	80S	SPARE	8'-8"	24590-WTP-MV-M59T-00015001, DET 2	2"-40S
N23	4"	80S	TEMPERATURE	8'-8"	24590-WTP-MV-M59T-00015001, DET 9	NA
N24	4"	80S	SPARE	8'-8	24590-WTP-MV-M59T-00015001, DET 9	BLIND
N25	6"	80S	SPARE	8'-8"	24590-WTP-MV-M59T-00015001, DET 9	BLIND
N26	4"	80S	SPARE	8'-8"	24590-WTP-MV-M59T-00015001, DET 9	BLIND



PLAN

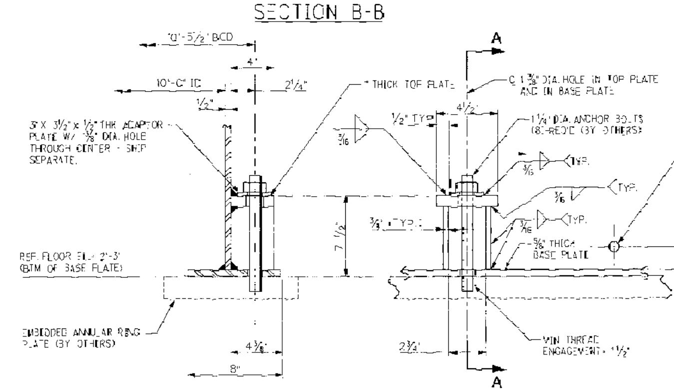


SECTION B-B



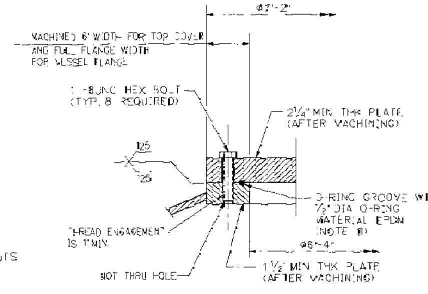
ELEVATION

TRUE NOZZLE ORIENTATION SHOWN ON PLAN VIEW
INTERNALS ARE SHOWN FOR CLARITY PURPOSE

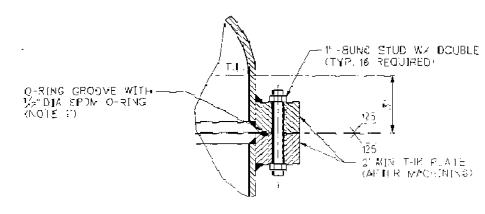


SECTION A-A

DETAIL 1



DETAIL 2



DETAIL 3

GENERAL NOTES :

1. DELETED
2. ALL INTERNAL AND EXTERNAL CREVICES NOT COVERED BY STRUCTURAL WELDS SHALL RECEIVE A SEAL PASS WELD TO FACILITATE CLEANING AND DECONTAMINATION OF VESSEL. A CREVICE IS DEFINED AS AN OPENING OR PARTIALLY ENCLOSED SPACE WHICH COULD CONTAIN PROCESS LIQUID OR VAPOR BY CAPILLARY ACTION AND WILL USUALLY HAVE A DEPTH GREATER THAN ITS SMALLEST SURFACE DIMENSION.
3. DELETED
4. LOCATION OF NAME PLATE & BRACKET TO BE CONFIRMED AT A LATER DATE.
5. 'Z' DIMENSION FOR SHELL NOZZLE MEASURED FROM C.L. OF NOZZLE FACE.
6. LOCATE LIFT LUGS SO THE BED WILL HANG LEVEL WITHIN 1/4" WHEN MEASURED ACROSS THE TOP FLAT COVER.
7. LOCATE LIFT LUGS SUCH THAT THE TOP HEAD ASSY REMAIN LEVEL WHEN SUSPENDED AS MEASURED ACROSS THE LARGEST DIAMETER WITHIN 1/2".
8. THE FIT UP OF THE HALF PIPE JACKET TO THE SBS SHALL BE AN OPEN-ROOT SINGLE BEVEL WELD CONFIGURATION. THE WELD SHALL BE ACCOMPLISHED WITH A MINIMUM OF TWO PASSES. THE ROOT PASS MUST BE APPLIED WITH THE GTAW PROCESS IN THE 1G OR 2G POSITION WITH A BACKING GAS. FOLLOWING PASSES MAY BE APPLIED WITH THE GTAW OR SMAW PROCESS. THE ROOT PASS SHALL BE VISUALLY INSPECTED 100% FOR LACK OF FUSION, JOINT PENETRATION, INFUSED METAL OR SLAG ON THE WELD JOINT. THE FINAL WELD SURFACE SHALL BE INSPECTED BY DYE PENETRANT EXAMINATION (PT).
9. THE INTERNAL COOLING COILS SHALL BE SUPPORTED FROM THE TOP HEAD TO FACILITATE REPLACEMENT SHOULD THE COILS FAIL.
10. BED SUPPORT MEDIA FROM NORTON CHEMICAL PROCESS PRODUCTS CORPORATION: DENSTONE 99 SUPPORT SPHERES 1" DIAMETER, MINIMUM PARTICLE DENSITY OF 115 LBS/CU-FT.
11. ALL SIDES OF THE GROOVE FOR THE O-RING GASKET SHALL BE MACHINED TO 63 AARH.
12. WHERE SHOWN, THREADED HOLES FOR NOZZLES N01 AND N02 SHALL HAVE THE WORD "SPARE" MACHINE ENGRAVED INTO THE PLATE IN 1/2" LETTERS NOT GREATER THAN 1/32" DEEP. SPARE HOLES SHALL BE PLUGGED WITH SOCKET HEAD SET SCREWS COATED WITH ANTI-SEIZE AND LUBRICATING COMPOUND (BOSTIK NEVER-SEEZ PURE NICKEL SPECIAL NUCLEAR GRADE OR BUYER APPROVED EQUAL).
13. THE CONTENTS OF THIS DOCUMENT ARE DANGEROUS WASTE PERMIT AFFECTING.

PLEASE NOTE THAT SOURCE, SPECIAL NUCLEAR AND BYPRODUCT MATERIALS AS DEFINED IN THE ATOMIC ENERGY ACT OF 1954 (AEA) ARE REGULATED AT THE U.S. DEPARTMENT OF ENERGY (DOE) FACILITIES EXCLUSIVELY BY DOE ACTING PURSUANT TO ITS AEA AUTHORITY. DOE ASSERTS, THAT PURSUANT TO THE AEA, IT HAS SOLE AND EXCLUSIVE RESPONSIBILITY AND AUTHORITY TO REGULATE SOURCE, SPECIAL NUCLEAR, AND BYPRODUCT MATERIAL AT DOE-OWNED NUCLEAR FACILITIES. INFORMATION CONTAINED HEREIN ON RADIONUCLIDES IS PROVIDED FOR PROCESS DESCRIPTION PURPOSES ONLY.

QUALITY LEVEL DESIGNATION FOR ALL COMPONENTS OF THIS VESSEL WILL BE QL-1

THIS DRAWING TO BE READ IN CONJUNCTION WITH THE MECHANICAL DATA SHEET NO 24590-LAW-MKD-LOP-P0008

DRAWING INDEX

DWG NO	REV	TITLE
24590-LAW-MK-LOP-P0001001	0	LAW SUBMERGED BED SCB LOP-SCB-00001, 2 (SH 1)
24590-LAW-MK-LOP-P0001002	0	LAW SUBMERGED BED SCB LOP-SCB-00001, 2 (SH 2)
24590-LAW-MK-LOP-P0001003	0	LAW SUBMERGED BED SCB LOP-SCB-00001, 2 (SH 3)

REFERENCE DRAWINGS

DWG NO	REV	TITLE
24590-LAW-M6-LOP-P0001	0	P&ID PRIMARY OFFGAS PROCESS SYSTEM MELTER 1
24590-LAW-M6-LOP-P0002	0	P&ID PRIMARY OFFGAS PROCESS SYSTEM MELTER 2
24590-WTP-MV-M59T-00001	2	PRESSURE VESSEL TOLERANCES STANDARD DETAILS
24590-WTP-MV-M59T-00010	1	TAILING LUG STANDARD DETAILS
24590-WTP-MV-M59T-00012	1	GROUNDING LUG STANDARD DETAILS
24590-WTP-MV-M59T-00016001	2	VESSEL CONNECTIONS STANDARD DETAILS SH 1 OF 3

REVISION HISTORY

REV	DESCRIPTION	ORG	CHKD	RVWD	APVD	DATE
0	ISSUED FOR PERMITTING USE					2/2/04

Q QUALITY LEVEL

PROJECT No.	24590
SITE	HANFORD
AREA	200E
BUILDING No.	20

	BY	DATE
ORIGINATOR		2-2-04
CHECKER		2-2-04
APPROVER		2/2/04
REVIEWER		2-2-04

CONTENT APPLICABLE TO ALARA? [ ] YES [ ] NO

BECHTEL

RIVER PROTECTION PROJECT
WASTE TREATMENT PLANT
2435 STEVENS CENTER PLACE
RICHLAND, WA 99352

CONTRACT No: DE-AC27-01RV14136

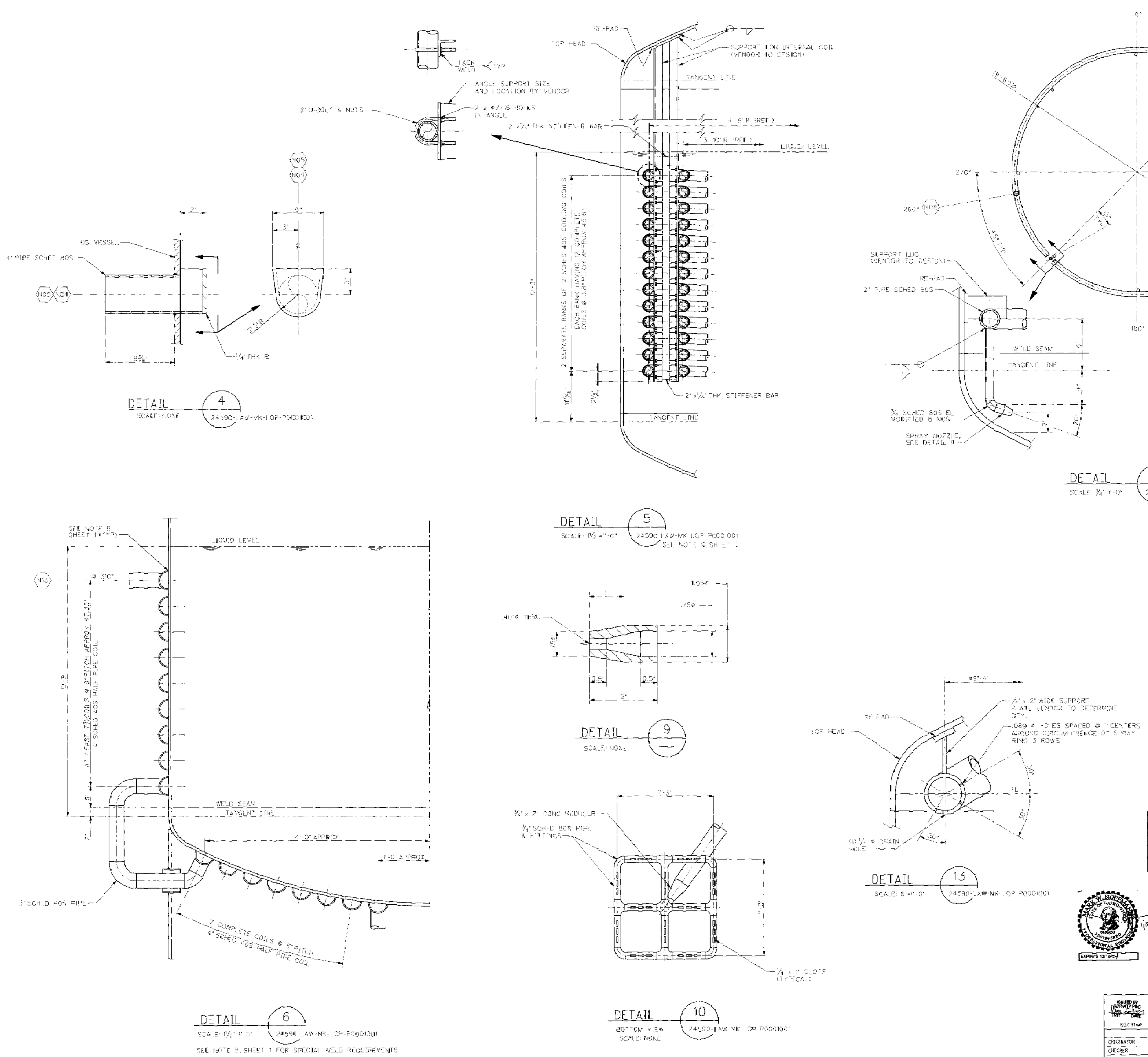
EQUIPMENT ASSEMBLY LAW SUBMERGED BED SCRUBBER LOP-SCB-00001 & 2 SHEET 1 OF 3

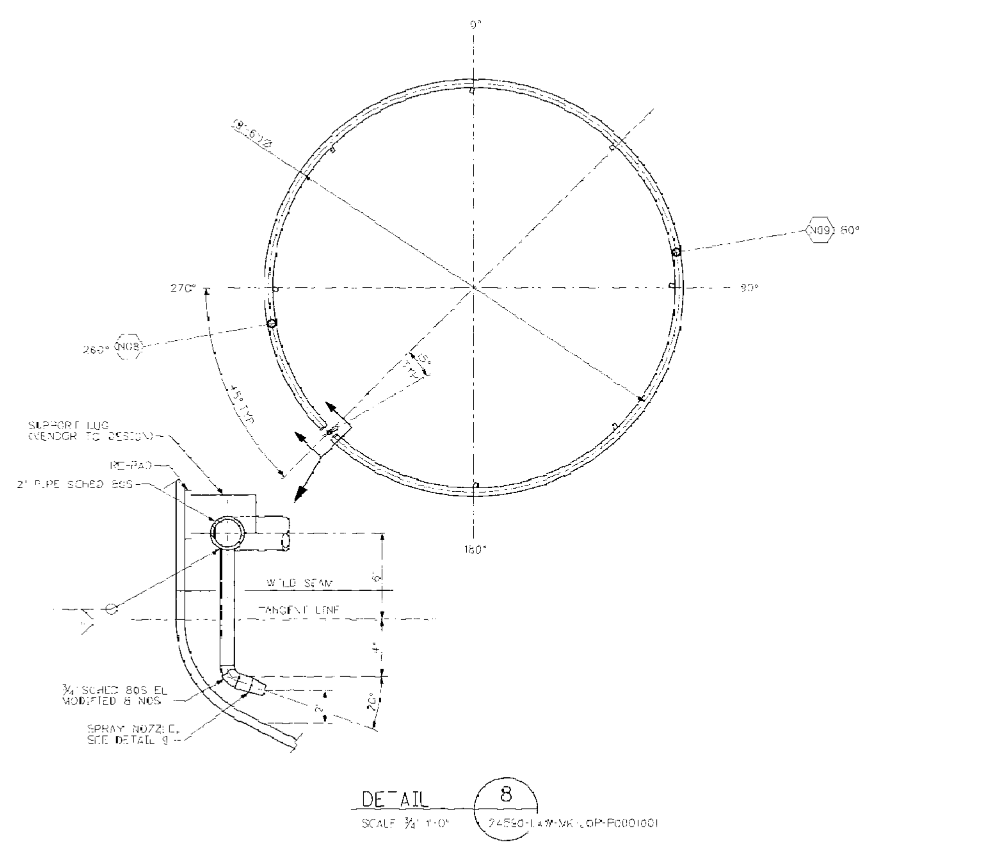
SCALE: NTS

24590-LAW-MK-LOP-P0001001 REV 0

E SIZE - 44x34
COMPUTER GENERATED - MANUAL CHANGES NOT PERMITTED

02/02/2004





NOTES:

1. FOR GENERAL NOTES, SEE 24590-LAW-MK-LOP-P0001001.
2. THE CONTENTS OF THIS DOCUMENT ARE DANGEROUS WASTE PERMIT AFFECTING.

PLEASE NOTE THAT SOURCE, SPECIAL NUCLEAR AND BYPRODUCT MATERIALS, AS DEFINED IN THE ATOMIC ENERGY ACT OF 1954 (AEA), ARE REGULATED AT THE U.S. DEPARTMENT OF ENERGY (DOE) FACILITIES EXCLUSIVELY BY DOE ACTING PURSUANT TO ITS AEA AUTHORITY. DOE ASSERTS, THAT PURSUANT TO THE AEA, IT HAS SOLE AND EXCLUSIVE RESPONSIBILITY AND AUTHORITY TO REGULATE SOURCE, SPECIAL NUCLEAR, AND BYPRODUCT MATERIAL AT DOE-OWNED NUCLEAR FACILITIES. INFORMATION CONTAINED HEREIN ON RADIONUCLIDES IS PROVIDED FOR PROCESS DESCRIPTION PURPOSES ONLY.

MARK W. HOFFMAN — STATE OF WASHINGTON — PROFESSIONAL ENGINEER
1/30/04
EXPIRES 12/10/04

REV	DESCRIPTION	DRG	CHKD	RVWD APVD	DATE
0	ISSUED FOR PERMITTING USE				1/30/04

REVISION HISTORY

QUALITY LEVEL: Q

ISSUED BY RPP-WTP PDC — ISSUE STAMP

PROJECT No.	24590
SITE	HANFORD
AREA	200E
BUILDING No.	20

BECHTEL
RIVER PROTECTION PROJECT
WASTE TREATMENT PLANT
2435 STEVENS CENTER PLACE
RICHLAND, WA 99352

CONTRACT No: DE-AC27-01RV14136

	BY	DATE
ORIGINATOR		1-27-04
CHECKER		1-27-04
APPROVER		1-30-04
REVIEWER		1-27-04

CONTENT APPLICABLE TO ALARA? YES NO
ADR NO. NA REV

EQUIPMENT ASSEMBLY
LAW SUBMERGED BED SCRUBBER
LOP-SCB-00001 & 2
SHEET 2 OF 3

SCALE: AS SHOWN

24590-LAW-MK-LOP-P0001002 REV 0

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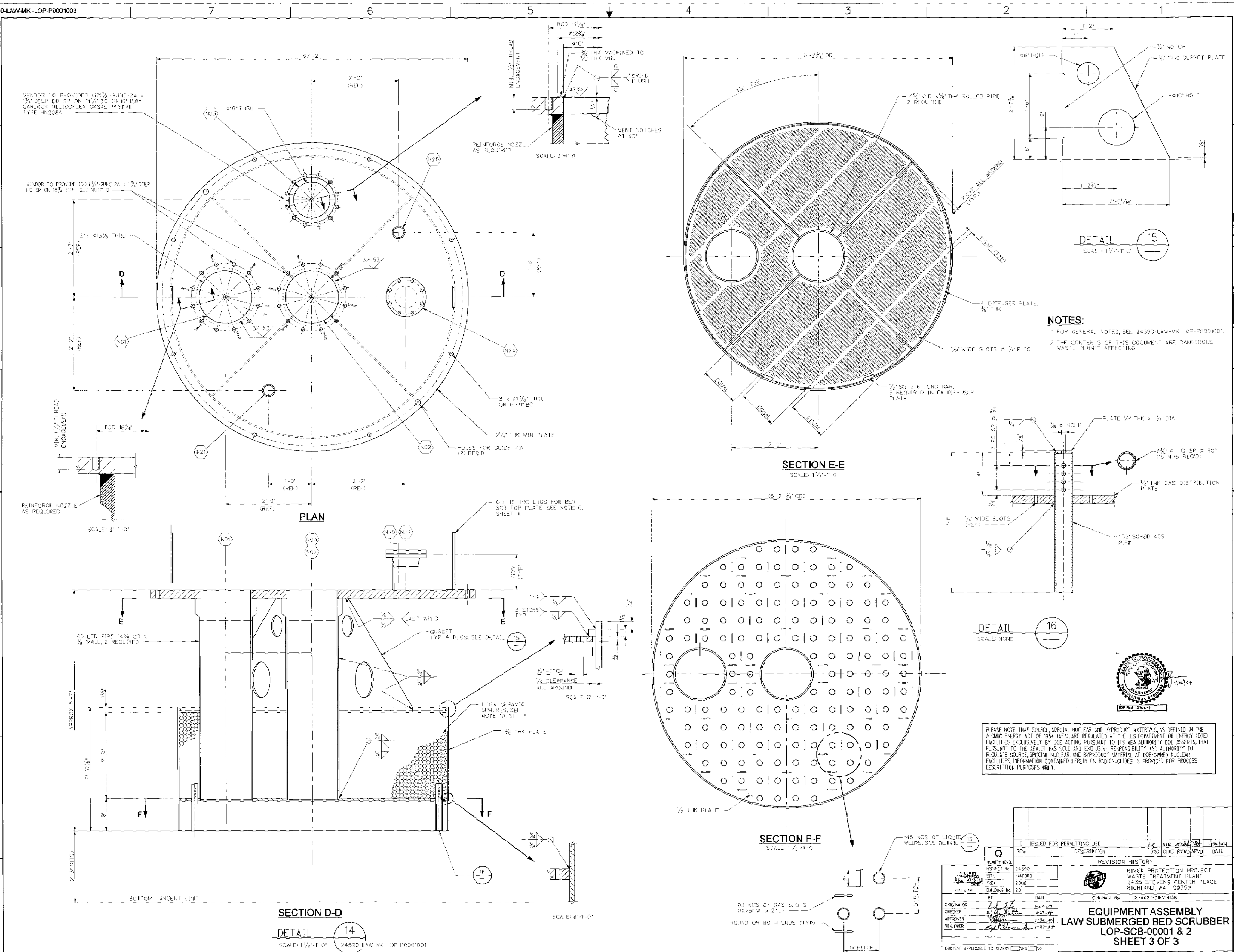
COMPUTER GENERATED - MANUAL CHANGES NOT PERMITTED



NOTES:

1. FOR GENERAL NOTES, SEE 24590-LAW-MK-LOP-P0001001.
2. THE CONTENTS OF THIS DOCUMENT ARE DANGEROUS WASTE PERMIT AFFECTING.

PLEASE NOTE THAT SOURCE, SPECIAL NUCLEAR AND BYPRODUCT MATERIALS, AS DEFINED IN THE ATOMIC ENERGY ACT OF 1954 (AEA), ARE REGULATED AT THE U.S. DEPARTMENT OF ENERGY (DOE) FACILITIES EXCLUSIVELY BY DOE ACTING PURSUANT TO ITS AEA AUTHORITY. DOE ASSERTS, THAT PURSUANT TO THE AEA, IT HAS SOLE AND EXCLUSIVE RESPONSIBILITY AND AUTHORITY TO REGULATE SOURCE, SPECIAL NUCLEAR, AND BYPRODUCT MATERIAL AT DOE-OWNED NUCLEAR FACILITIES. INFORMATION CONTAINED HEREIN ON RADIONUCLIDES IS PROVIDED FOR PROCESS DESCRIPTION PURPOSES ONLY.

REV	DESCRIPTION	ORG	CHKD	RVWD	APVD	DATE
C	ISSUED FOR PERMITTING USE					1/30/04

REVISION HISTORY

QUALITY LEVEL: Q

PROJECT No.	24590
SITE	HANFORD
AREA	20BE
BUILDING No.	20

RIVER PROTECTION PROJECT
WASTE TREATMENT PLANT
2435 STEVENS CENTER PLACE
RICHLAND, WA 99352

CONTRACT No: DE-AC27-01RV14136

	BY	DATE
ORIGINATOR		1-27-04
CHECKER		1-27-04
APPROVER		1-30-04
REVIEWER		1-27-04

CONTENT APPLICABLE TO ALARA? YES NO
ADR NO. REV:
NA

EQUIPMENT ASSEMBLY
LAW SUBMERGED BED SCRUBBER
LOP-SCB-00001 & 2
SHEET 3 OF 3

SCALE: AS SHOWN

24590-LAW-MK-LOP-P0001003 REV 0

E SIZE - 44x34
COMPUTER GENERATED - MANUAL CHANGES NOT PERMITTED

01/27/2004 09:32:19 AM

MECHANICAL DATA SHEET: TANK

Plant Item No. (Equipment No.)

24590-LAW-MT-LVP-TK-00001

R10338829

Project	**RPP-WTP**	P&ID	**24590-LAW-M6-LVP-P0002**
Project No	**24590**	Process Data Sheet.	**Deleted**
Project Site	**Hanford**	Tank Drawing	**24590-LAW-MT-LVP-P0004**
Description:	**LAW Caustic Collection Tank**		

ISSUED BY RPP-WTP PDC

Design Data

Quality Level		**Commercial Grade (CM)**		Fabrication Specs	**N/A**		
Seismic Category		**SC-III**		Design Standard	**API 650 J & S**		
Service/Contents		**Scrubber Solution**		Pumping Rate In GPM	**62**		
		Operating	Design	Pumping Rate Out GPM	**Batch**		
Internal Pressure	psig	**ATM**	**Per Code**	Postweld Heat Treat	**API 650**		
Temperature	°F	**144**	**180**	Design Specific Gravity	**1.14**		
Min Design Metal Temp.	°F	**50**					
Vapor Pressure	psia	**N/A**		Weights (lbs)	Empty	Operating	Test
Max Operating Volume	gal	**11,919**		Estimated	**12,500**	**125,500**	**131,300**
Total Volume	gal	**14,232**		Actual *			

Shell Design	**API 650**			
Roof Design	**API 650**			
Roof Type	**Conical**			
Frangible Roof Joint	**No**			
Uniform Live Load (roof)	lbf/ft² **25**	Special Loads	lbf/ft²	**24590-WTP-3PS-FB01-T0001**
Insulation Loads	lbf/ft² **N/A**	Gases in Vapor Space		
Roof Seam	**Butt**	Floor Seam	**Butt**	
Foundation Type	**Concrete Pad**			
Lightning Protection	**Grounding Lugs**			
Cathodic Protection	**N/A**			

Seismic Design	**24590-WTP-3PS-FB01-T0001**				
Seismic Zone	**2B**			Importance Factor	**Per API 650**
Zone Factor	**Per API 650**			Site Coefficient	**N/A**
Wind Velocity	**N/A**	Outside Temp, Min/Max, °F	**59/95**	Provide Intermediate Wind Girder	**N/A**
Maximum Precipitation	**N/A**			Snow Accumulation	**None**

Please note that source, special nuclear and byproduct materials, as defined in the Atomic Energy Act of 1954 (AEA), are regulated at the U.S. Department of Energy (DOE) facilities exclusively by DOE acting pursuant to its AEA authority. DOE asserts, that pursuant to the AEA, it has sole and exclusive responsibility and authority to regulate source, special nuclear and byproduct materials at DOE-owned nuclear facilities. Information contained herein on radionuclides is provided for process description purposes only.

MACARIO G. SANVICTORES STATE OF WASHINGTON 29255 REGISTERED PROFESSIONAL ENGINEER

7/19/04

EXPIRES: 09/21/05

This bound document contains a total of 2 sheets

0	7/19/04	Issued for Permitting Use				
REV	DATE	REASON FOR REVISION	PREPARER	CHECKER	REVIEWER	APPROVER

	MECHANICAL DATA SHEET: TANK	Plant Item No. (Equipment No.) ***24590-LAW-MT-LVP-TK-00001***

Materials of Construction

Component	Material	Minimum Thickness/ Size **	Corrosion Allowance, in	Coatings/Finishing/Surface Preparation Specification 24590-WTP-3PS-AFPS-T0005	
				Internal (See Specification)	External (See Specification)
Roof	***SA240 316 (Note 1)***	***0.250"***	***0.04***	***None***	***None***
Shell	***SA240 316 (Note 1)***	***0.3125"***	***0.04***	***None***	***None***
Floor	***SA240 316 (Note 1)***	***0.3125"***	***0.04***	***None***	***None***
Internals	***SA240 316 (Note 1)***	***0.2275"***	***0.04***	***None***	***None***
Structural - Internal	***SA240 316 (Note 1)***	***0.2275"***	***0.04***	***None***	***None***
Structural – External	***SA240 316 (Note 1)***	***API 650***	***N/A***	***None***	***None***
Pipe	***SA312 TP316 (Note 1)***	***API 650***	***0.04***	***None***	***None***
Forgings/ Bar stock	***SA182 F316 (Note 1)***	***N/A***	***0.04***	***N/A***	***None***
Gaskets	***Spiral Wound 316 FG***	***N/A***	***N/A***	***N/A***	***None***
Bolting	***SA193 B8***	***N/A***	***N/A***	***N/A***	***None***

Miscellaneous data.

Insulation Function	***N/A***	Insulation Material
Insulation Thickness (inch).	***N/A***	***N/A***

Remarks

Notes:

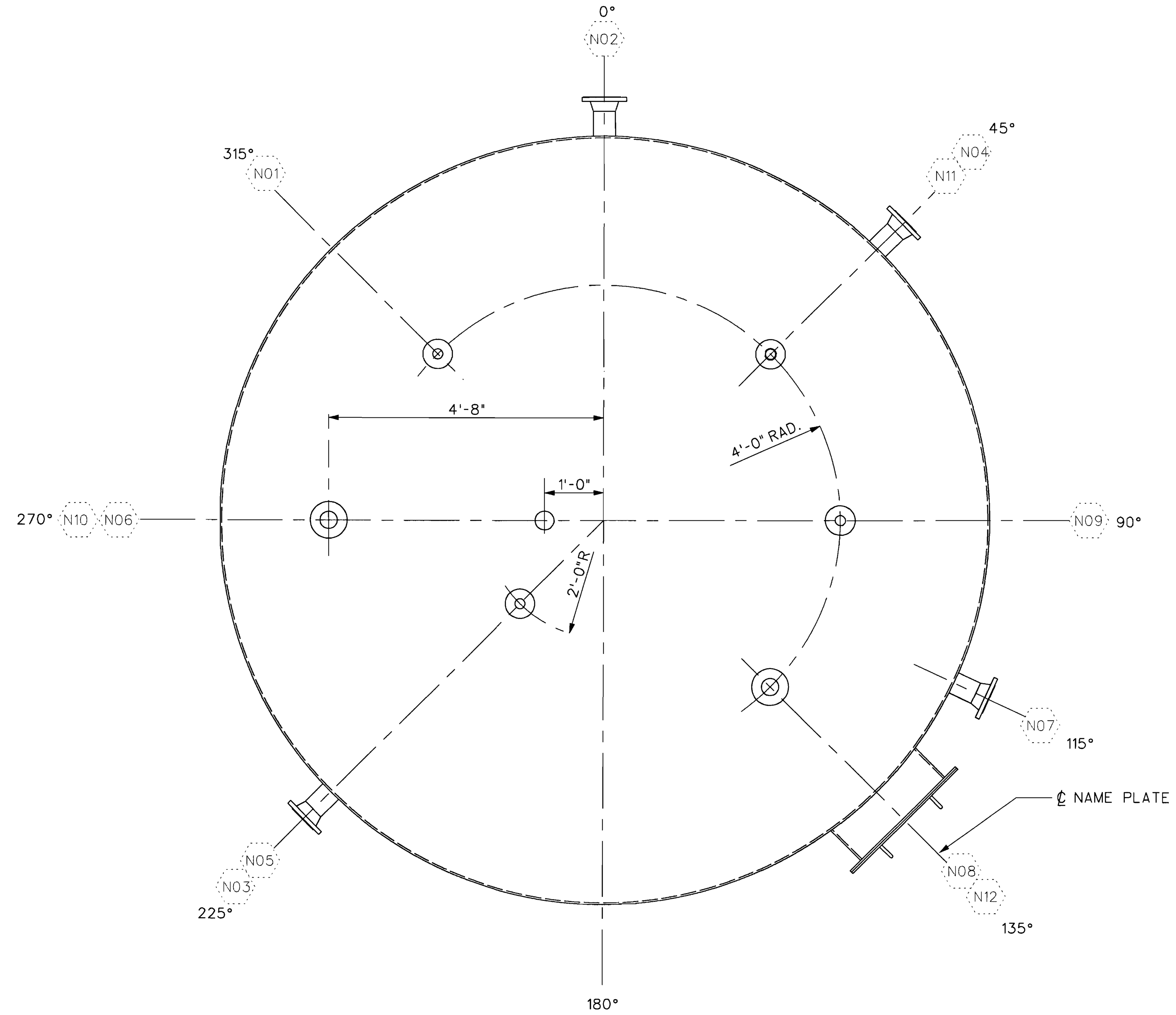
* ***To be determined by vendor.***

** ***The minimum thickness stated includes corrosion allowance.***

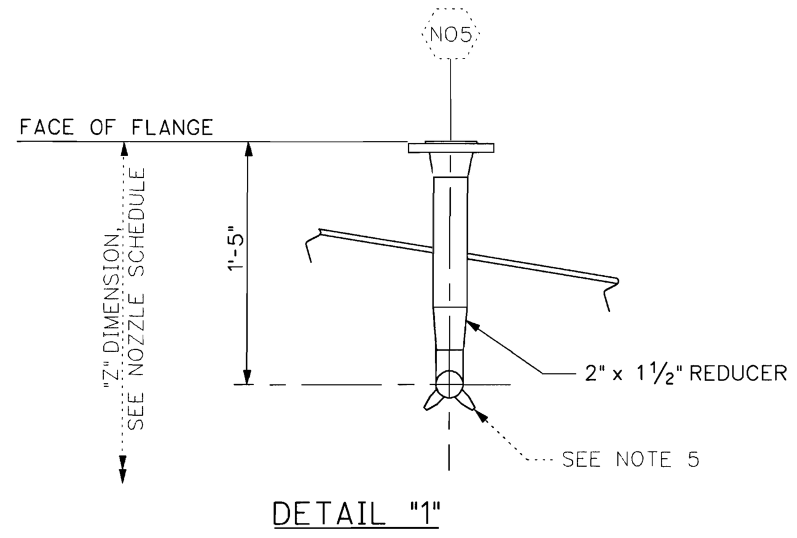
Note 1: SA240 316, SA182 F316 & SA312 TP316 stainless steel material shall have carbon content of 0.030% maximum, dual certified. Non welded items are excluded from these requirements.

Note 2: Contents of this document are Dangerous Waste Permit affecting.

NOZZLE	SIZE	SCHED/WALL	CLASS	TYPE	SERVICE/REMARKS	"Z'DIM	REF DWG/DET	CONN PIPE SIZE/SCHED
N01	3"	80S	150	RFWN	INLET	15'-3"	24590-WTP-MV-M59T-00016001 DET. 11	N/A
N02	4"	80S	150	RFWN	OUTLET	0'-9"	24590-WTP-MV-M59T-00016001 DET. 8	N/A
N03	4"	80S	150	RFWN	OUTLET	0'-9"	24590-WTP-MV-M59T-00016001 DET. 8	N/A
N04	4"	80S	150	RFWN	OVERFLOW	TBD	24590-WTP-MV-M59T-00016001 DET. 8	N/A
N05	2"	80S	150	RFWN	INLET TO SPRAY NOZZLE	15'-9"	24590-WTP-MV-M59T-00016001 DET. 9	N/A
N06	4"	80S	150	STUB W/180° ELBOW	VENT	15"-9"	24590-WTP-MV-M59T-00016001 DET. 1	N/A
N07	3"	80S	150	RFWN	LEVEL INSTRUMENT	TBD	24590-WTP-MV-M59T-00016001 DET. 9	N/A
N08	3"	80S	150	RFWN	RECIRCULATION INLET	15'-2"	24590-WTP-MV-M59T-00016001 DET. 9	N/A
N09	2"	80S	150	RFWN	PROCESS WATER INLET	15'-3"	24590-WTP-MV-M59T-00016001 DET. 9	N/A
N10	2"	80S	150	RFWN	SPARE	15'-3"	24590-WTP-MV-M59T-00016001 DET. 9	W/ BLIND FLANGE
N11	2"	80S	150	RFWN	SPARE	15'-3"	24590-WTP-MV-M59T-00016001 DET. 9	W/ BLIND FLANGE
N12	24"	PLATE	API 650	--	SHELL MANWAY	2'-6"	N/A	API 650



PLAN



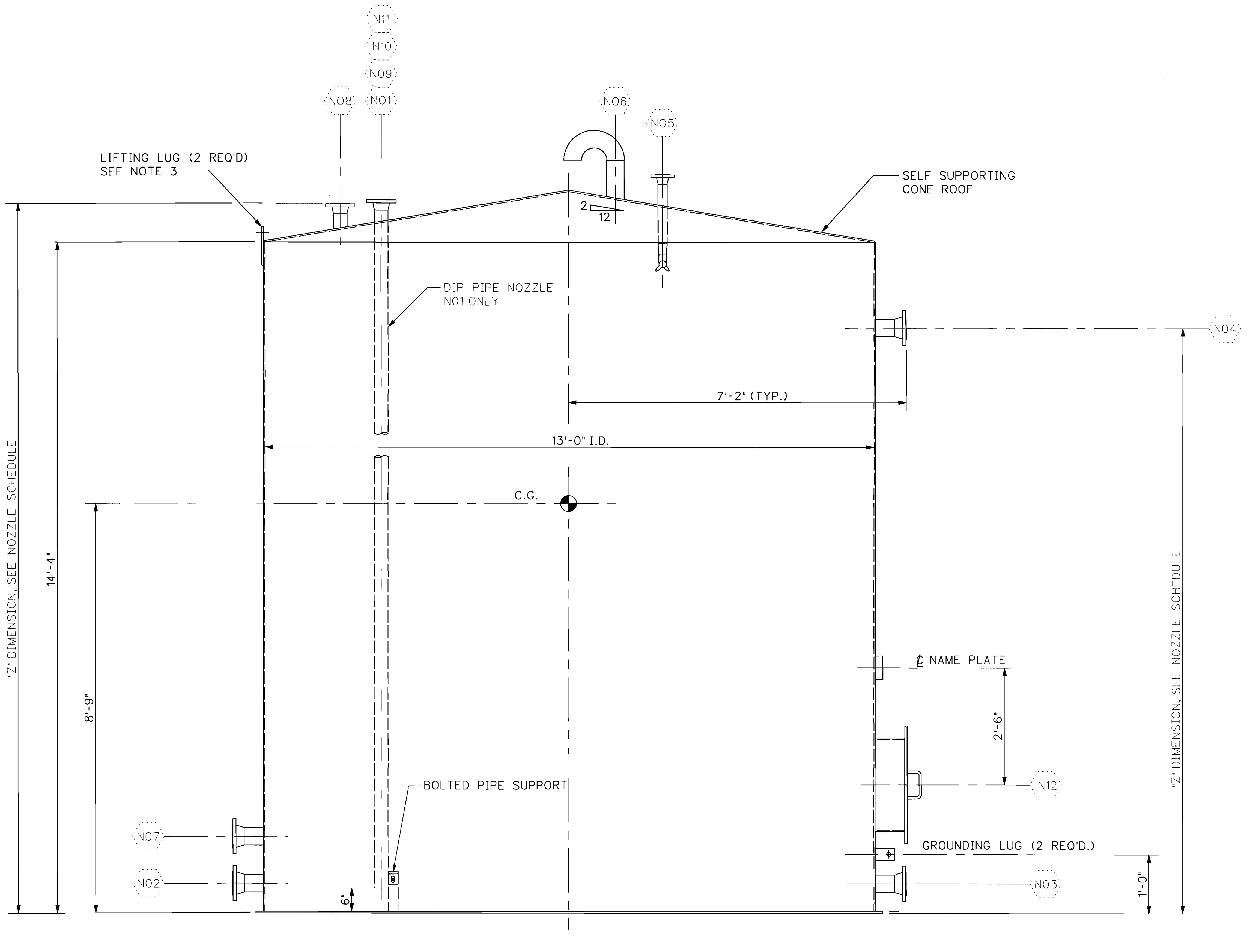
DETAIL "1"

GENERAL NOTES

1. "Z" DIMENSION FOR SHELL NOZZLE MEASURED FROM CENTER LINE OF NOZZLE FACE.
2. SELLER TO DESIGN BASE PLATE AND ANCHOR BOLT CHAIRS.
3. SELLER TO DESIGN AND FURNISH LIFTING LUGS.
4. ALL THE THICKNESSES AND SCHEDULE / WALL THICKNESS SHOWN ON THE NOZZLE TABLE ARE MINIMUM, SELLER TO CONFIRM THE ACTUAL WALL THICKNESS TO BE USED.
5. SELLER TO PROVIDE THE INTERNAL SPRAY JET NOZZLE (MODEL GAMAJET VIII) FOR NOZZLE N05.
6. CONTENTS OF THIS DOCUMENT ARE DANGEROUS WASTE PERMIT AFFECTING.

HOLDS

1. LIFTING LUG LOCATIONS PENDING REVIEW BY CONSTRUCTION.
2. GROUNDING LUG LOCATION PENDING REVIEW BY ELECTRICAL GROUP.
3. FINAL NOZZLE ORIENTATIONS AND ELEVATIONS PENDING CONFIRMATION BY PLANT DESIGN.



ELEVATION
FOR TRUE ORIENTATION SEE PLAN

PLEASE NOTE THAT SOURCE, SPECIAL NUCLEAR AND BYPRODUCT MATERIALS, AS DEFINED IN THE ATOMIC ENERGY ACT OF 1954 (AEA), ARE REGULATED AT THE U.S. DEPARTMENT OF ENERGY (DOE) FACILITIES EXCLUSIVELY BY DOE ACTING PURSUANT TO ITS AEA AUTHORITY. DOE ASSERTS, THAT PURSUANT TO THE AEA, IT HAS SOLE AND EXCLUSIVE RESPONSIBILITY AND AUTHORITY TO REGULATE SOURCE, SPECIAL NUCLEAR, AND BYPRODUCT MATERIAL AT DOE-OWNED NUCLEAR FACILITIES. INFORMATION CONTAINED HEREIN ON RADIONUCLIDES IS PROVIDED FOR PROCESS DESCRIPTION PURPOSES ONLY.

MARIO C. SANVICTORES
STATE OF WASHINGTON
REGISTERED PROFESSIONAL ENGINEER
EXPIRES: 09/21/05
7/19/04

THIS DRAWING TO BE READ IN CONJUNCTION WITH THE MECHANICAL DATA SHEET NO 24590-LAW-MTD-LVP-P0001

REFERENCE DRAWINGS		
DWG NO	REV	TITLE
24590-LAW-M6-LVP-P0002		P&ID
24590-WTP-MV-M59T-00001		PRESSURE VESSEL TOLERANCES STANDARD DETAILS
24590-WTP-MV-M59T-00012		GROUNDING LUG STANDARD DETAILS
24590-WTP-MV-M59T-00016001		VESSEL CONNECTIONS STANDARD DETAILS SHEET 1 of 3

CM

REV	DESCRIPTION	ORG	CHKD	RVWD	APVD	DATE
0	ISSUED FOR PERMITTING USE	[signature]	ate	RT	✓	7/19/04

REVISION HISTORY

ISSUED BY RPP-WTP PDC
7/20/04
INIT DATE
ISSUE STAMP

PROJECT No.	24590
SITE	HANFORD
AREA	200E
BUILDING No.	20

BECHTEL
RIVER PROTECTION PROJECT
WASTE TREATMENT PLANT
2435 STEVENS CENTER PLACE
RICHLAND, WA 99352

	BY	DATE
ORIGINATOR	[signature]	7/13/04
CHECKER	[signature]	7/13/04
APPROVER	[signature]	7/19/04
REVIEWER	[signature]	7/13/04

CONTENT APPLICABLE TO ALARA? [XX] YES [ ] NO
ADR NO. N/A REV:

CONTRACT No: DE-AC27-01RV14136

EQUIPMENT ASSEMBLY LAW CAUSTIC COLLECTION TANK LVP-TK-00001

SCALE: NTS
24590-LAW-MT-LVP-P0004
REV 0

R10338828
D BY: jrwilli3
\dms05069\LAWMTLVPP0004.dgn

R10505709

BECHTEL	**MECHANICAL DATA SHEET: VESSEL**	**PLANT ITEM No.** ***24590-LAW-MV-LCP-VSL-00001***

Project:	***RPP-WTP***	P&ID:	***24590-LAW-M6-LCP-P0001***
Project No:	***24590***	Process Data Sheet:	***Deleted***
Project Site:	***Hanford***	Vessel Drawing	***24590-LAW-MV-LCP-P0001***
Description:	***LAW Concentrate Receipt Vessel***		

Reference Data

Charge Vessels (Tag Numbers)	***Not Applicable***
Pulsejet Mixers / Agitators (Tag Numbers)	***Not Applicable***
RFDs/Pumps (Tag Numbers)	***Not Applicable***

Design Data

Quality Level		***CM (Note 3)***	Fabrication Specs	***24590-WTP-3PS-MV00-TP001 (PVDF)***		
Seismic Category		***SC-III***	Design Code	***ASME VIII Div 1***		
Service/Contents		***LAW Concentrate Feed***	Code Stamp	***Yes***		
Design Specific Gravity		***1.47***	NB Registration	***Yes***		
Maximum Operating Volume	gal	***15,435***	Weights (lbs)	Empty	Operating	Test
Total Volume	gal	***18,130***	Estimated	***49,200***	***235,700***	***199,900***
			Actual *			

Inside Diameter	inch	***168***			Wind Design	***Not Required***
Length/Height (TL-TL)	inch	***153***			Snow Design	***Not Required***
		Vessel Operating	Vessel Design	Coil/Jacket Design	Seismic Design	***24590-WTP-3PS-MV00-TP002*** ***24590-WTP-3PS-FB01-T0001***
Internal Pressure	psig	***0.07***	***15***	***None***	Seismic Base Moment *	ft*lb
External Pressure	psig	***4.09***	***FV***	***None***	Postweld Heat Treat	***Not Required***
Temperature	°F	***122***	***150***	***None***	Corrosion Allowance	Inch ***0.04***
Min. Design Metal Temp.	°F	***40***			Hydrostatic Test Pressure *	psig

Note: Please note that source, special nuclear and byproduct materials, as defined in the Atomic Energy Act of 1954 (AEA), are regulated at the U.S. Department of Energy (DOE) facilities exclusively by DOE acting pursuant to its AEA authority. DOE asserts, that pursuant to the AEA, it has sole and exclusive responsibility and authority to regulate source, special nuclear, and byproduct materials at DOE-owned nuclear facilities. Information contained herein on radionuclides is provided for process description purposes only.

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Materials of Construction

Component	Material	Minimum Thickness / Size	Containment
Top Head	***SA-240 316 (Note 1)***	***See Drawing***	***Auxiliary***
Shell	***SA-240 316 (Note 1)***	***See Drawing***	***Primary***
Bottom Head	***SA-240 316 (Note 1)***	***See Drawing***	***Primary***
Support	***SA-240 304 (Note 1)***	***See Drawing***	***N/A***
Jacket/Coils/Half-Pipe Jacket	***NA***	***N/A*** 1	***N/A***
Internals	***SA-240 316/SA-312 TP316 (Note 1)***	***See Drawing***	***Thermowells Primary***
Pipe	***SA-312 TP316 Seamless (Note 1)***	***See Drawing***	***Note 2***
Forgings/ Bar stock	***SA-182 F316 (Note 1)***	***See Drawing***	***N/A***
Gaskets (O Ring)	***EPDM*** 1	***N/A***	***N/A***
Bolting	***SA-193 Gr. B8M / SA-194 Gr. 8M*** 1	***N/A***	***N/A***

Miscellaneous Data

Orientation	***Vertical***	Support Type	***Skirt***
Insulation Function	***Not Applicable***	Insulation Material	***Not Applicable***
Insulation Thickness (inch)	***Not Applicable***	Internal Finish	***Welds descaled as laid***
		External Finish	***Welds descaled as laid***

Remarks

**** To be determined by the vendor.***

Note 1: Material shall have Carbon Content of 0.030% Max. Non-welded specialty items are excluded from this requirement.

Note 2: Nozzle necks below normal operating level are Primary, others Auxiliary. See PVDF and vessel drawing for NDE. 1

Note 3: Additional NDE requirements should be as per 6.4 of the PVDF. 1

Note 4: Contents of this document are dangerous waste permit affecting. 1

Equipment Cyclic Data Sheet 1

Component Plant Item Number:	***24590-LAW-MV-LCP-VSL-00001***
Component Description	***Parent Vessel***

The information below is provisional and envelopes operational duty for fatigue assessment. It is not to be used as operational data.

Materials of Construction	***SA-240 316***
Design Life	***40 years***
Component Function and Life Cycle Description	***Equipment Shut Down for maintenance occurs annually.***

Load Type		Min	Max	Number of Cycles	Comment
Design Pressure	psig	***FV***	***15***	***100***	
Operating Pressure	psig	***-4.09***	***0.07***	***100***	***Maximum of 100 start/stop cycles per 40 years of design life***
Operating Temperature	°F	***59***	***122***	***100***	
Contents Specific Gravity		***1.0***	***1.47***	***100***	
Contents Level	inch	***31.00***	***170.00***	***100***	

Localized Features		
Nozzles	***Within 50° F of vessel temperature.***	***As above.***
Supports	***Same as vessel***	***Number of cycles same as vessel***

Notes

- ***Cycle increase: The Seller must increase the numbers of operational cycles given above by 10% to account for commissioning duty unless otherwise noted.***

R10505710

MECHANICAL DATA SHEET: VESSEL

PLANT ITEM No.

24590-LAW-MV-LCP-VSL-00002

Project	***RPP-WTP***	P&ID.	***24590-LAW-M6-LCP-P0002***
Project No	***24590***	Process Data Sheet:	~~***Deleted***~~ 1 JH 3/7/05
Project Site	***Hanford***	Vessel Drawing	***24590-LAW-MV-LCP-P0002***
Description:	***LAW Concentrate Receipt Vessel*** 1		

Reference Data

Charge Vessels (Tag Numbers)	***Not Applicable***
Pulsejet Mixers / Agitators (Tag Numbers)	***Not Applicable*** 1
RFDs/Pumps (Tag Numbers)	***Not Applicable*** 1

Design Data

Quality Level		***CM (Note 3)***	Fabrication Specs	***24590-WTP-3PS-MV00-TP001 (PVDF)*** 1		
Seismic Category		***SC-III***	Design Code	***ASME VIII Div 1***		
Service/Contents		***LAW Concentrate Feed***	Code Stamp	***Yes***		
Design Specific Gravity		***1.47***	NB Registration	***Yes***		
Maximum Operating Volume	gal	***15,435***	Weights (lbs)	Empty	Operating	Test
Total Volume	gal	***18,130***	Estimated	***49,200***	***235,700***	***199,900***
			Actual *			

Inside Diameter	inch	***168***			Wind Design	***Not Required***
Length/Height (TL-TL)	inch	***153***			Snow Design	***Not Required***
		Vessel Operating	Vessel Design	Coil/Jacket Design	Seismic Design	***24590-WTP-3PS-MV00-TP002*** ***24590-WTP-3PS-FB01-T0001***
Internal Pressure	psig	***0.07***	***15***	***None***	Seismic Base Moment *	ft*lb
External Pressure	psig	***4.09*** 1	***FV***	***None***	Postweld Heat Treat	***Not Required***
Temperature	°F	***122***	***150***	***None***	Corrosion Allowance	Inch ***0.04***
Min. Design Metal Temp.	°F	***40***			Hydrostatic Test Pressure *	psig

Note: Please note that source, special nuclear and byproduct materials, as defined in the Atomic Energy Act of 1954 (AEA), are regulated at the U.S. Department of Energy (DOE) facilities exclusively by DOE acting pursuant to its AEA authority. DOE asserts, that pursuant to the AEA, it has sole and exclusive responsibility and authority to regulate source, special nuclear, and byproduct materials at DOE-owned nuclear facilities. Information contained herein on radionuclides is provided for process description purposes only.

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MECHANICAL DATA SHEET: VESSEL

PLANT ITEM No.
24590-LAW-MV-LCP-VSL-00002

Materials of Construction

Component	Material	Minimum Thickness / Size	Containment
Top Head	***SA-240 316 (Note 1)***	***See Drawing***	***Auxiliary***
Shell	***SA-240 316 (Note 1)***	***See Drawing***	***Primary***
Bottom Head	***SA-240 316 (Note 1)***	***See Drawing***	***Primary***
Support	***SA-240 304 (Note 1)***	***See Drawing***	***N/A***
Jacket/Coils/Half-Pipe Jacket	***NA***	***N/A*** 1	***N/A***
Internals	***SA-240 316/SA-312 TP316 (Note 1)***	***See Drawing***	***Thermowells Primary***
Pipe	***SA-312 TP316 Seamless (Note 1)***	***See Drawing***	***Note 2***
Forgings/ Bar stock	***SA-182 F316 (Note 1)***	***See Drawing***	***N/A***
Gaskets (O Ring)	***EPDM*** 1	***N/A***	***N/A***
Bolting	***SA-193 Gr. B8M / SA-194 Gr. 8M*** 1	***N/A***	***N/A***

Miscellaneous Data

Orientation	***Vertical***	Support Type	***Skirt***
Insulation Function	***Not Applicable***	Insulation Material	***Not Applicable***
Insulation Thickness (inch)	***Not Applicable***	Internal Finish	***Welds descaled as laid***
		External Finish	***Welds descaled as laid***

Remarks

**** To be determined by the vendor.***
Note 1: Material shall have Carbon Content of 0.030% Max. Non-welded specialty items are excluded from this requirement.
Note 2: Nozzle necks below normal operating level are Primary, others Auxiliary. See PVDF and vessel drawing for NDE. 1
Note 3: Additional NDE requirements should be as per 6.4 of the PVDF. 1
Note 4: Contents of this document are dangerous waste permit affecting. 1

	MECHANICAL DATA SHEET: VESSEL	PLANT ITEM No. 24590-LAW-MV-LCP-VSL-00002

Equipment Cyclic Data Sheet ⚠1

Component Plant Item Number:	***24590-LAW-MV-LCP-VSL-00002***
Component Description	***Parent Vessel***

The information below is provisional and envelopes operational duty for fatigue assessment. It is not to be used as operational data.

Materials of Construction	***SA-240 316***
Design Life	***40 years***
Component Function and Life Cycle Description	***Equipment Shut Down for maintenance occurs annually.***

Load Type		Min	Max	Number of Cycles	Comment
Design Pressure	psig	***FV***	***15***	***100***	
Operating Pressure	psig	***-4.09***	***0.07***	***100***	***Maximum of 100 start/stop cycles per 40 years of design life***
Operating Temperature	°F	***59***	***122***	***100***	
Contents Specific Gravity		***1.0***	***1.47***	***100***	
Contents Level	inch	***31.00***	***170.00***	***100***	
Localized Features					
Nozzles		***Within 50° F of vessel temperature.***		***As above.***	
Supports		***Same as vessel***		***Number of cycles same as vessel***	

Notes

- ***Cycle increase: The Seller must increase the numbers of operational cycles given above by 10% to account for commissioning duty unless otherwise noted.***

R10505699

BECHTEL	**MECHANICAL DATA SHEET: VESSEL**	**PLANT ITEM No.** ***24590-LAW-LFP-VSL-00002***

Project:	***RPP-WTP***	P&ID:	***24590-LAW-M6-LFP-P0001; 24590-LAW-M6-LFP-P0002***
Project No:	***24590***	Process Data Sheet:	~~Deleted~~ 1 MH 3/7/05
Project Site:	***Hanford***	Vessel Drawing	***24590-LAW-MV-LFP-P0001***
Description:	***Melter 1 Feed Vessel***		

Reference Data

Charge Vessels (Tag Numbers)	***Not Applicable***
Pulsejet Mixers / Agitators (Tag Numbers)	***LFP-AGT-00002***
RFDs/Pumps (Tag Numbers)	***LFP-PMP-00007, LFP-PMP-00008, LFP-PMP-00009, LFP-PMP-00010, LFP-PMP-00011, LFP-PMP-00012, LFP-PMP-00002***
Spray Nozzles	***LFP-NOZ-00003, LFP-NOZ-00004, LFP-NOZ-00005***

Design Data

Quality Level		***CM (Note 4)***	Fabrication Specs	***24590-WTP-3PS-MV00-TP001***		
Seismic Category		***SC-III***	Design Code	***ASME VIII Div 1***		
Service/Contents		***LAW Melter Feed***	Code Stamp	***Yes***		
Design Specific Gravity		***1.90***	NB Registration	***Yes***		
Maximum Operating Volume	gal	***7,689***	Weights (lbs)	Empty	Operating	Test
Total Volume	gal	***9,123***	Estimated	***44,500***	***164,600***	***120,800***
			Actual *			

Inside Diameter	inch	***132***			Wind Design	***Not Required***		
Length/Height (TL-TL)	inch	***126***			Snow Design	***Not Required***		
		Vessel Operating	Vessel Design	Coil/Jacket Design	Seismic Design	***24590-WTP-3PS-MV00-TP002*** ***24590-WTP-3PS-FB01-T0001***		
Internal Pressure	psig	***0.07***	***15***	***None***	Seismic Base Moment *	ft*lb		
External Pressure	psig	***4.09*** 1	***FV***	***None***	Postweld Heat Treat	***Not Required***		
Temperature	°F	***98***	***150***	***None***	Corrosion Allowance	Inch	***0.04 Top Head*** ***0.125 Shell & Btm Head***	
Min. Design Metal Temp.	°F	***40***			Hydrostatic Test Pressure *	psig		

Note: Please note that source, special nuclear and byproduct materials, as defined in the Atomic Energy Act of 1954 (AEA), are regulated at the U.S. Department of Energy (DOE) facilities exclusively by DOE acting pursuant to its AEA authority. DOE asserts, that pursuant to the AEA, it has sole and exclusive responsibility and authority to regulate source, special nuclear, and byproduct materials at DOE-owned nuclear facilities. Information contained herein on radionuclides is provided for process description purposes only.

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		PLANT ITEM No.
BECHTEL	MECHANICAL DATA SHEET: VESSEL	*24590-LAW-LFP-VSL-00002*

Materials of Construction

Component	Material	Minimum Thickness / Size	Containment
Top Head	***SA-240 316 (Note 2)***	***See Drawing***	***Auxiliary***
Shell	***SA-240 316 (Note 2)***	***See Drawing***	***Primary***
Bottom Head	***SA-240 316 (Note 2)***	***See Drawing***	***Primary***
Support	***SA-240 304 (Note 2)***	***See Drawing***	***N/A***
Jacket/Coils/Half-Pipe Jacket	***N/A***	***N/A*** 1	***N/A***
Internals	***SA-240 316 (Note 2)***	***See Drawing***	***Thermowells Primary***
Pipe (Seamless)	***SA-312 TP316 Seamless (Note 2)***	***See Drawing***	***Note 3***
Forgings/ Bar stock	***SA-182 F316 (Note 2)***	***See Drawing***	***N/A***
Gaskets (O Ring)	***EPDM O-Ring***	***N/A***	***N/A***
Bolting	***SA-193 B8M / SA-194 8M***	***N/A***	***N/A***

Miscellaneous Data

Orientation	***Vertical***	Support Type	***Skirt***
Insulation Function	***Not Applicable***	Insulation Material	***Not Applicable***
Insulation Thickness (inch)	***Not Applicable***	Internal Finish	***Welds descaled as laid***
		External Finish	***Welds descaled as laid***

Remarks

• To be determined by the vendor.
Note 1: Deleted.
Note 2: Material shall have Carbon Content of 0.030% Max. Non-welded items are excluded from this requirement.
Note 3: Nozzle necks below normal operating level are Primary, others Auxiliary. See 24590-WTP-3PS-MV00-TP001 for NDE. 1
Note 4: Additional NDE requirements should be as per 6.4 of 24590-WTP-3PS-MV00-TP001.
Note 5: Contents of this document are dangerous waste permit affecting. 1

R10505700

MECHANICAL DATA SHEET: VESSEL

PLANT ITEM No.
24590-LAW-LFP-VSL-00004

Project:	***RPP-WTP***	P&ID:	***24590-LAW-M6-LFP-P0003; 24590-LAW-M6-LFP-P0004***
Project No:	***24590***	Process Data Sheet:	~~***Deleted***~~ 1 WH 3/7/05
Project Site:	***Hanford***	Vessel Drawing	***24590-LAW-MV-LFP-P0002***
Description:	***Melter 2 Feed Vessel***		

Reference Data

Charge Vessels (Tag Numbers)	***Not Applicable***
Pulsejet Mixers / Agitators (Tag Numbers)	***LFP-AGT-00004***
RFDs/Pumps (Tag Numbers)	***LFP-PMP-00013, LFP-PMP-00014, LFP-PMP-00015, LFP-PMP-00016, LFP-PMP-00017, LFP-PMP-00018, LFP-PMP-00004***
Spray Nozzles	***LFP-NOZ-00008, LFP-NOZ-00009, LFP-NOZ-00010***

Design Data

Quality Level		***CM (Note 4)***	Fabrication Specs	***24590-WTP-3PS-MV00-TP001***		
Seismic Category		***SC-III***	Design Code	***ASME VIII Div 1***		
Service/Contents		***LAW Melter Feed***	Code Stamp	***Yes***		
Design Specific Gravity		***1.90***	NB Registration	***Yes***		
Maximum Operating Volume	gal	***7,689***	Weights (lbs)	Empty	Operating	Test
Total Volume	gal	***9,123***	Estimated	***44,500***	***164,600***	***120,800***
			Actual *			

Inside Diameter	inch	***132***			Wind Design		***Not Required***
Length/Height (TL-TL)	inch	***126***			Snow Design		***Not Required***
		Vessel Operating	Vessel Design	Coil/Jacket Design	Seismic Design		***24590-WTP-3PS-MV00-TP002*** ***24590-WTP-3PS-FB01-T0001***
Internal Pressure	psig	***0.07***	***15***	***None***	Seismic Base Moment *	ft*lb	
External Pressure	psig	***4.09*** 1	***FV***	***None***	Postweld Heat Treat		***Not Required***
Temperature	°F	***98***	***150***	***None***	Corrosion Allowance	Inch	***0.04 Top Head*** ***0.125 Shell & Btm Head***
Min. Design Metal Temp.	°F	***40***			Hydrostatic Test Pressure *	psig	

Note: Please note that source, special nuclear and byproduct materials, as defined in the Atomic Energy Act of 1954 (AEA), are regulated at the U.S. Department of Energy (DOE) facilities exclusively by DOE acting pursuant to its AEA authority. DOE asserts, that pursuant to the AEA, it has sole and exclusive responsibility and authority to regulate source, special nuclear, and byproduct materials at DOE-owned nuclear facilities. Information contained herein on radionuclides is provided for process description purposes only.

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		PLANT ITEM No.
BECHTEL	**MECHANICAL DATA SHEET: VESSEL**	***24590-LAW-LFP-VSL-00004***

Materials of Construction

Component	Material	Minimum Thickness / Size	Containment
Top Head	***SA-240 316 (Note 2)***	***See Drawing***	***Auxiliary***
Shell	***SA-240 316 (Note 2)***	***See Drawing***	***Primary***
Bottom Head	***SA-240 316 (Note 2)***	***See Drawing***	***Primary***
Support	***SA-240 304 (Note 2)***	***See Drawing***	***N/A***
Jacket/Coils/Half-Pipe Jacket	***N/A***	***N/A*** 1	***N/A***
Internals	***SA-240 316 (Note 2)***	***See Drawing***	***Thermowells Primary***
Pipe (Seamless)	***SA-312 TP316 Seamless (Note 2)***	***See Drawing***	***Note 3***
Forgings/ Bar stock	***SA-182 F316 (Note 2)***	***See Drawing***	***N/A***
Gaskets (O Ring)	***EPDM O-Ring***	***N/A***	***N/A***
Bolting	***SA-193 B8M / SA-194 8M***	***N/A***	***N/A***

Miscellaneous Data

Orientation	***Vertical***	Support Type	***Skirt***
Insulation Function	***Not Applicable***	Insulation Material	***Not Applicable***
Insulation Thickness (inch)	***Not Applicable***	Internal Finish	***Welds descaled as laid***
		External Finish	***Welds descaled as laid***

Remarks

- ***To be determined by the vendor.***

Note 1: Deleted.
Note 2: Material shall have Carbon Content of 0.030% Max. Non-welded items are excluded from this requirement.
Note 3: Nozzle necks below normal operating level are Primary, others Auxiliary. See 24590-WTP-3PS-MV00-TP001 for NDE. 1
Note 4: Additional NDE requirements should be as per 6.4 of 24590-WTP-3PS-MV00-TP001.
Note 5: Contents of this document are dangerous waste permit affecting. 1

R10505701

BECHTEL	**MECHANICAL DATA SHEET: VESSEL**	**PLANT ITEM No.** ***24590-LAW-LFP-VSL-00001***

Project:	***RPP-WTP***	P&ID:	***24590-LAW-M6-LFP-P0001; 24590-LAW-M6-LFP-P0002*** 1
Project No:	***24590***	Process Data Sheet:	~~***Deleted***~~ 1 WF 3/7/05
Project Site.	***Hanford***	Vessel Drawing	***24590-LAW-MV-LFP-P0004***
Description:	***Melter 1 Feed Prep Vessel***		

Reference Data

Charge Vessels (Tag Numbers)	***Not Applicable***
Pulsejet Mixers / Agitators (Tag Numbers)	***LFP-AGT-00001***
RFDs/Pumps (Tag Numbers)	***LFP-PMP-00001A, LFP-PMP-00001B***
Spray Nozzles	***LFP-NOZ-00001, LFP-NOZ-00002***

Design Data

Quality Level		***CM (Note 4)***	Fabrication Specs	***24590-WTP-3PS-MV00-TP001***		
Seismic Category		***SC-III***	Design Code	***ASME VIII Div 1***		
Service/Contents		***LAW Melter Feed***	Code Stamp	***Yes***		
Design Specific Gravity		***1.90***	NB Registration	***Yes***		
Maximum Operating Volume	gal	***7,689***	Weights (lbs)	Empty	Operating	Test
Total Volume	gal	***9,123***	Estimated	***37,000***	***157,100***	***113,300***
			Actual *			

Inside Diameter	inch	***132***			Wind Design	***Not Required***	
Length/Height (TL-TL)	inch	***126***			Snow Design	***Not Required***	
		Vessel Operating	Vessel Design	Coil/Jacket Design	Seismic Design	***24590-WTP-3PS-MV00-TP002*** ***24590-WTP-3PS-FB01-T0001***	
Internal Pressure	psig	***0.07***	***15***	***None***	Seismic Base Moment *	ft*lb	
External Pressure	psig	***4.09***	***FV***	***None***	Postweld Heat Treat	***Not Required***	
Temperature	°F	***98***	***150***	***None***	Corrosion Allowance	Inch	***0.04 Top Head*** ***0.125 Shell & Btm Head***
Min Design Metal Temp.	°F	***40***			Hydrostatic Test Pressure *	psig	

Note: Please note that source, special nuclear and byproduct materials, as defined in the Atomic Energy Act of 1954 (AEA), are regulated at the U.S. Department of Energy (DOE) facilities exclusively by DOE acting pursuant to its AEA authority. DOE asserts, that pursuant to the AEA, it has sole and exclusive responsibility and authority to regulate source, special nuclear, and byproduct materials at DOE-owned nuclear facilities. Information contained herein on radionuclides is provided for process description purposes only.

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	MECHANICAL DATA SHEET: VESSEL	PLANT ITEM No. 24590-LAW-LFP-VSL-00001

Materials of Construction

Component	Material	Minimum Thickness / Size	Containment
Top Head	***SA-240 316 (Note 2)***	***See Drawing***	***Auxiliary***
Shell	***SA-240 316 (Note 2)***	***See Drawing***	***Primary***
Bottom Head	***SA-240 316 (Note 2)***	***See Drawing***	***Primary***
Support	***SA-240 304 (Note 2)***	***See Drawing***	***N/A***
Jacket/Coils/Half-Pipe Jacket	***N/A***	***N/A*** 1	***N/A***
Internals	***SA-240 316 (Note 2)***	***See Drawing***	***Thermowells Primary***
Pipe (Seamless)	***SA-312 TP316 Seamless (Note 2)***	***See Drawing***	***Note 3***
Forgings/ Bar stock	***SA-182 F316 (Note 2)***	***See Drawing***	***N/A***
Gaskets (O Ring)	***EPDM O-Ring***	***N/A***	***N/A***
Bolting	***SA-193 B8M / SA-194 8M***	***N/A***	***N/A***

Miscellaneous Data

Orientation	***Vertical***	Support Type	***Skirt***
Insulation Function	***Not Applicable***	Insulation Material	***Not Applicable***
Insulation Thickness (inch)	***Not Applicable***	Internal Finish	***Welds descaled as laid***
		External Finish	***Welds descaled as laid***

Remarks

**** To be determined by the vendor.***
Note 1: Deleted.
Note 2: Material shall have Carbon Content of 0.030% Max. Non-welded items are excluded from this requirement.
Note 3: Nozzle necks below normal operating level are Primary, others Auxiliary. See 24590-WTP-3PS-MV00-TP001 for NDE. 1
Note 4: Additional NDE requirements should be as per 6.4 of 24590-WTP-3PS-MV00-TP001.
Note 5: Contents of this document are dangerous waste permit affecting. 1

R10505702

BECHTEL	**MECHANICAL DATA SHEET: VESSEL**	**PLANT ITEM No.** ***24590-LAW-LFP-VSL-00003***

Project:	***RPP-WTP***	P&ID:	***24590-LAW-M6-LFP-P0003; 24590-LAW-M6-LFP-P0004*** 1
Project No:	***24590***	Process Data Sheet:	~~Deleted~~ 1 3/7/05
Project Site:	***Hanford***	Vessel Drawing	***24590-LAW-MV-LFP-P0005***
Description:	***Melter 2 Feed Prep Vessel***		

Reference Data

Charge Vessels (Tag Numbers)	***Not Applicable***
Pulsejet Mixers / Agitators (Tag Numbers)	***LFP-AGT-00003***
RFDs/Pumps (Tag Numbers)	***LFP-PMP-00003A, LFP-PMP-00003B*** 1
Spray Nozzles	***LFP-NOZ-00006, LFP-NOZ-00007***

Design Data

Quality Level		***CM (Note 4)***	Fabrication Specs	***24590-WTP-3PS-MV00-TP001***		
Seismic Category		***SC-III***	Design Code	***ASME VIII Div 1***		
Service/Contents		***LAW Melter Feed***	Code Stamp	***Yes***		
Design Specific Gravity		***1.90***	NB Registration	***Yes***		
Maximum Operating Volume	gal	***7,689***	Weights (lbs)	Empty	Operating	Test
Total Volume	gal	***9,123***	Estimated	***37,000***	***157,100***	***113,300***
			Actual *			

Inside Diameter	inch	***132***			Wind Design	***Not Required***		
Length/Height (TL-TL)	inch	***126***			Snow Design	***Not Required***		
		Vessel Operating	Vessel Design	Coil/Jacket Design	Seismic Design	***24590-WTP-3PS-MV00-TP002*** ***24590-WTP-3PS-FB01-T0001***		
Internal Pressure	psig	***0.07***	***15***	***None***	Seismic Base Moment *	ft*lb		
External Pressure	psig	***4.09*** 1	***FV***	***None***	Postweld Heat Treat	***Not Required***		
Temperature	°F	***98***	***150***	***None***	Corrosion Allowance	Inch	***0.04 Top Head*** ***0.125 Shell & Btm Head***	
Min. Design Metal Temp.	°F	***40***			Hydrostatic Test Pressure *	psig		

Note: Please note that source, special nuclear and byproduct materials, as defined in the Atomic Energy Act of 1954 (AEA), are regulated at the U.S. Department of Energy (DOE) facilities exclusively by DOE acting pursuant to its AEA authority. DOE asserts, that pursuant to the AEA, it has sole and exclusive responsibility and authority to regulate source, special nuclear, and byproduct materials at DOE-owned nuclear facilities. Information contained herein on radionuclides is provided for process description purposes only.

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1	Issued for Permitting Use					3/7/05
0	Issued for Permitting Use	J. Jackson	S. Lee	C. Slater	E. Klsem	12/29/03

	MECHANICAL DATA SHEET: VESSEL	PLANT ITEM No. 24590-LAW-LFP-VSL-00003

Materials of Construction

Component	Material	Minimum Thickness / Size	Containment
Top Head	***SA-240 316 (Note 2)***	***See Drawing***	***Auxiliary***
Shell	***SA-240 316 (Note 2)***	***See Drawing***	***Primary***
Bottom Head	***SA-240 316 (Note 2)***	***See Drawing***	***Primary***
Support	***SA-240 304 (Note 2)***	***See Drawing***	***N/A***
Jacket/Coils/Half-Pipe Jacket	***N/A***	***N/A*** 1	***N/A***
Internals	***SA-240 316 (Note 2)***	***See Drawing***	***Thermowells Primary***
Pipe (Seamless)	***SA-312 TP316 Seamless (Note 2)***	***See Drawing***	***Note 3***
Forgings/ Bar stock	***SA-182 F316 (Note 2)***	***See Drawing***	***N/A***
Gaskets (O Ring)	***EPDM O-Ring***	***N/A***	***N/A***
Bolting	***SA-193 B8M / SA-194 8M***	***N/A***	***N/A***

Miscellaneous Data

Orientation	***Vertical***	Support Type	***Skirt***
Insulation Function	***Not Applicable***	Insulation Material	***Not Applicable***
Insulation Thickness (inch)	***Not Applicable***	Internal Finish	***Welds descaled as laid***
		External Finish	***Welds descaled as laid***

Remarks

**** To be determined by the vendor.***

Note 1: Deleted.

Note 2: Material shall have Carbon Content of 0.030% Max. Non-welded items are excluded from this requirement.

Note 3: Nozzle necks below normal operating level are Primary, others Auxiliary. See 24590-WTP-3PS-MV00-TP001 for NDE. 1

Note 4: Additional NDE requirements should be as per 6.4 of 24590-WTP-3PS-MV00-TP001.

Note 5: Contents of this document are dangerous waste permit affecting. 1

	MECHANICAL DATA SHEET: VESSEL	PLANT ITEM No. 24590-LAW-MV-LOP-VSL-00001

Project:	RPP-WTP	P&ID:	24590-LAW-M6-LOP-P0001
Project No:	24590	Process Data Sheet:	
Project Site:	Hanford	Vessel Drawing	24590-LAW-MV-LOP-P0001
Description:	LAW Melter 1 SBS Condensate Vessel		

Reference Data

Charge Vessels (Tag Numbers)	Not Applicable
Pulsejet Mixers / Agitators (Tag Numbers)	24590-LAW-MY-LOP-EDUC-00001A
RFDs/Pumps (Tag Numbers)	Not Applicable

Design Data

Quality Level		QL-1 (1)	Fabrication Specs	24590-WTP-3PS-MV00-TP001 (PVDF)		
Seismic Category		SC-III	Design Code	ASME VIII Div 1		
Service/Contents		LAW Condensate	Code Stamp	Yes		
Design Specific Gravity		1.03	NB Registration	Yes		
Maximum Operating Volume	gal	7,402	Weights (lbs)	Empty	Operating	Test
Total Volume	gal	9,056	Estimated	25,500	91,700	100,800
			Actual *			

Inside Diameter	inch	144			Wind Design		Not Required	
Length/Height (TL-TL)	inch	98			Snow Design		Not Required	
		Vessel Operating	Vessel Design	Coil/Jacket Design	Seismic Design		24590-WTP-3PS-MV00-TP002 24590-WTP-3PS-FB01-T0001 (1)	
Internal Pressure	psig	2.00	15	125	Seismic Base Moment *	ft*lb		
External Pressure	psig	2.00	FV	FV	Postweld Heat Treat		Not Required	
Temperature	°F	212	237	237	Corrosion Allowance	Inch	0.08 vessel (Note 5), 0.04 Jacket (1)	
Min. Design Metal Temp.	°F	40			Hydrostatic Test Pressure *	psig		

Note: Please note that source, special nuclear and byproduct materials, as defined in the Atomic Energy Act of 1954 (AEA), are regulated at the U.S. Department of Energy (DOE) facilities exclusively by DOE acting pursuant to its AEA authority. DOE asserts, that pursuant to the AEA, it has sole and exclusive responsibility and authority to regulate source, special nuclear, and byproduct materials at DOE-owned nuclear facilities. Information contained herein on radionuclides is provided for process description purposes only.

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1	Issued for Permitting Use					3/14/05
0	Issued for Permitting Use	K. Brightman	S. Lee	C. Slater	E. Isern	1/27/04

R10507391

Materials of Construction

Component	Material	Minimum Thickness / Size	Containment
Top Head	***SB-575 N06022***	***See Drawing***	***Auxiliary***
Shell	***SB-575 N06022***	***See Drawing***	***Primary***
Bottom Head	***SB-575 N06022***	***See Drawing***	***Primary***
Support	***SA-240 304 (Note 1 & 6)*** 1	***See Drawing***	***N/A***
Jacket/Coils/Half-Pipe Jacket	***SA-312 304 (Note 1)***	***See Drawing***	***N/A***
Internals	***SB-575 N06022 / SB-622 N06022 (Note 7)*** 1	***See Drawing***	***Thermowells Primary***
Pipe (Seamless)	***SB-622 N06022 & SB-622 N06276 (For 1 1/2" & 2" Pipe) / SA-312 TP304***	***See Drawing***	***Note 2***
Forgings/ Bar stock	***SB-564 N06022 / SA182 F304***	***See Drawing***	***N/A***
Gaskets (O Ring)	***EPDM***	***N/A***	***N/A***
Bolting	***SA-193 Gr. B8M / SA-194 Gr. 8M***	***N/A***	***N/A***

Miscellaneous Data

Orientation	***Vertical***	Support Type	***Skirt***
Insulation Function	***Not Applicable***	Insulation Material	***Not Applicable***
Insulation Thickness (inch)	***Not Applicable***	Internal Finish	***Descaled as laid***
		External Finish	***Note 3***

Remarks

**** To be determined by the vendor.***

Note 1: Material shall have Carbon Content of 0.030% Max. Non-welded specialty items are excluded from this requirement.

Note 2: Nozzle necks below normal operating level are Primary, others Auxiliary. See PVDF and vessel drawing for NDT.

Note 3: Shell welds under half pipe coils to be ground smooth. Others descaled as laid.

Note 4: Contents of this document are Dangerous Waste Permit affecting.

Note 5: Corrosion allowance of 0.01" is also to be added to the external surface of shell under the jacket. 1

Note 6: Use SA-240 316 material for skirt and base chair gussets as design change by SDDR No. 24590-WTP-SDDR-PROC-04-00936. 1

Note 7: Use Hastelloy C-276 in lieu of Hastelloy C-22 material for removable eductor guide cone as reference by SDDR No. 24590-WTP-SDDR-PROC-04-01080. 1

Equipment Cyclical Data Sheet

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BECHTEL	**MECHANICAL DATA SHEET: VESSEL**	**PLANT ITEM No.** *24590-LAW-MV-LOP-VSL-00002*

Project:	***RPP-WTP***	P&ID:	***24590-LAW-M6-LOP-P0002***
Project No:	***24590***	Process Data Sheet:	
Project Site:	***Hanford***	Vessel Drawing	***24590-LAW-MV-LOP-P0002***
Description:	***LAW Melter 2 SBS Condensate Vessel***		

Reference Data

Charge Vessels (Tag Numbers)	***Not Applicable***
Pulsejet Mixers / Agitators (Tag Numbers)	***24590-LAW-MY-LOP-EDUC-00002A***
RFDs/Pumps (Tag Numbers)	***Not Applicable***

Design Data

Quality Level		***QL-1***	Fabrication Specs	***24590-WTP-3PS-MV00-TP001 (PVDF)***		
Seismic Category		***SC-III*** 1	Design Code	***ASME VIII Div 1***		
Service/Contents		***LAW Condensate***	Code Stamp	***Yes***		
Design Specific Gravity		***1.03***	NB Registration	***Yes***		
Maximum Operating Volume	gal	***7,402***	Weights (lbs)	Empty	Operating	Test
Total Volume	gal	***9,056***	Estimated	***25,500***	***91,700***	***100,800***
			Actual *			

Inside Diameter	inch	***144***			Wind Design	***Not Required***	
Length/Height (TL-TL)	inch	***98***			Snow Design	***Not Required***	
		Vessel Operating	Vessel Design	Coil/Jacket Design	Seismic Design	***24590-WTP-3PS-MV00-TP002*** ***24590-WTP-3PS-FB01-T0001*** 1	
Internal Pressure	psig	***2.00***	***15***	***125***	Seismic Base Moment *	ft*lb	
External Pressure	psig	***2.00***	***FV***	***FV***	Postweld Heat Treat	***Not Required***	
Temperature	°F	***212***	***237***	***237***	Corrosion Allowance	Inch	***0.08 vessel (Note 5), 0.04 Jacket*** 1
Min. Design Metal Temp.	°F	***40***			Hydrostatic Test Pressure *	psig	

Note: Please note that source, special nuclear and byproduct materials, as defined in the Atomic Energy Act of 1954 (AEA), are regulated at the U.S. Department of Energy (DOE) facilities exclusively by DOE acting pursuant to its AEA authority. DOE asserts, that pursuant to the AEA, it has sole and exclusive responsibility and authority to regulate source, special nuclear, and byproduct materials at DOE-owned nuclear facilities. Information contained herein on radionuclides is provided for process description purposes only.

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R10507392

		PLANT ITEM No.
	MECHANICAL DATA SHEET: VESSEL	*24590-LAW-MV-LOP-VSL-00002*

Materials of Construction

Component	Material	Minimum Thickness / Size	Containment
Top Head	***SB-575 N06022***	***See Drawing***	***Auxiliary***
Shell	***SB-575 N06022***	***See Drawing***	***Primary***
Bottom Head	***SB-575 N06022***	***See Drawing***	***Primary***
Support	***SA-240 304 (Note 1 & 6)*** 1	***See Drawing***	***N/A***
Jacket/Coils/Half-Pipe Jacket	***SA-312 304 (Note 1)***	***See Drawing***	***N/A***
Internals	***SB-575 N06022 / SB-622 N06022 (Note 7)*** 1	***See Drawing***	***Thermowells Primary***
Pipe (Seamless)	***SB-622 N06022 & SB-622 N06276 (For 1 1/2" & 2" Pipe) / SA-312 TP304***	***See Drawing***	***Note 2***
Forgings/ Bar stock	***SB-564 N06022 / SA182 F304***	***See Drawing***	***N/A***
Gaskets (O Ring)	***EPDM***	***N/A***	***N/A***
Bolting	***SA-193 Gr. B8M / SA-194 Gr 8M***	***N/A***	***N/A***

Miscellaneous Data

Orientation	***Vertical***	Support Type	***Skirt***
Insulation Function	***Not Applicable***	Insulation Material	***Not Applicable***
Insulation Thickness (inch)	***Not Applicable***	Internal Finish	***Descaled as laid***
		External Finish	***Note 3***

Remarks

**** To be determined by the vendor.***

Note 1: Material shall have Carbon Content of 0.030% Max. Non-welded specialty items are excluded from this requirement.

Note 2: Nozzle necks below normal operating level are Primary, others Auxiliary. See PVDF and vessel drawing for NDT.

Note 3: Shell welds under half pipe coils to be ground smooth. Others descaled as laid.

Note 4: Contents of this document are Dangerous Waste Permit affecting.

Note 5: Corrosion allowance of 0.01" is also to be added to the external surface of shell under the jacket. 1

Note 6: Use SA-240 316 material for skirt and base chair gussets as design change by SDDR No. 24590-WTP-SDDR-PROC-04-00936. 1

Note 7: Use Hastelloy C-276 in lieu of Hastelloy C-22 material for removable eductor guide cone as reference by SDDR No. 24590-WTP-SDDR-PROC-04-01080. 1

Equipment Cyclic Data Sheet

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R10046394

MECHANICAL DATA SHEET: VESSEL

PLANT ITEM No.
24590-LAW-MV-RLD-VSL-00004

Project:	***RPP-WTP***	P&ID:	***24590-LAW-M6-RLD-P0002***
Project No:	***24590***	Process Data Sheet:	***24590-LAW-MVD-RLD-00002***
Site:	***Hanford***	Vessel Drawing	***24590-LAW-MV-RLD-P0001***
Description:	***C3/C5 Drains/Sump Collection Vessel***		

Reference Data

Charge Vessels (Tag Numbers)	***Not Applicable***
Pulsejet Mixers (Tag Numbers)	***Not Applicable***
RFDs/Pumps (Tag Numbers)	***Not Applicable***

Design Data

Quality Level		***CM*** 1	Fabrication Specs	***24590-WTP-3PS-MV00-TP001 (PVDF)***		
Seismic Category		***SC-3***	Design Code	***ASME VIII Div 1***		
Service/Contents		***Radioactive Liquid***	Code Stamp	***Yes***		
			NB Registration	***Yes***		
Design Specific Gravity		***1.47*** 1	Weights (lbs)	Empty	Operating	Test
Operating Volume	gal	***6510*** 1	Estimated	***17000***	***86500*** 1	***82300***
Total Volume	gal	***7696*** 1	Actual *	***20650*** 1	***102000*** 1	***86150*** 1

Inside Diameter	inch	***120***			Wind Design	***Not Required***	
Length/Height (TL-TL)	inch	***132***			Snow Design	***Not Required***	
		Vessel Operating	Vessel Design		Seismic Design	***24590-WTP-3PS-MV00-TP002*** ***24590-WTP-3PS-FB01-T0001*** 1	
Internal Pressure	psig	***Atm***	***15***	***None***	Seismic Base Moment *	ft*lb	
External Pressure	psig	***0.6***	***FV***	***None***	Postweld Heat Treat	***Not Required***	
Temperature	°F	***158***	***183***	***None***	Corrosion Allowance	inch	***0.04***
Min. Design Metal Temp.	°F	***-20*** 1			Hydrostatic Test Pressure *	psig	***20*** 1

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0	08/09/02	Issued for Permitting Use	Josh Velasquez	Cliff Slater		Suzanne Kirk

DATA SHEET #: 24590-LAW-MVD-RLD-P0001, Rev. 1

MECHANICAL DATA SHEET: VESSEL

PLANT ITEM No.
24590-LAW-MV-RLD-VSL-00004

Materials of Construction

Component	Material	Minimum Thickness	Containment
Top Head	***SA-240 316 (Note 5)***	***See Drawing***	***Auxiliary***
Shell	***SA-240 316 (Note 5)***	***See Drawing***	***Primary***
Bottom Head	***SA-240 316 (Note 5) (Note 6)***	***See Drawing***	***Primary***
Support	***SA-240 304 (Note 5)*** 1	***See Drawing***	***Not Applicable***
Jacket/Coils/Half-Pipe Jacket	***None***	***Not Applicable***	***Not Applicable***
Internals	***SA-240 316 (Note 5)***	***See Drawing***	***Thermowells Primary*** 1
Pipe	***SA-312 316 (Note 5) Seamless*** 1	***See Drawing***	***Note 1***
Forgings/ Bar stock	***SA-182 F316 (Note 5)***	***See Drawing***	***Not Applicable***
Gaskets 1	***Note 7***	***Not Applicable***	***Not Applicable***
Bolting	***SA-194 B8 / SA-193 8***	***See Drawing***	***Not Applicable***

Miscellaneous Data

Orientation	***Vertical***	Support Type	***Skirt***
Insulation Function	***None***	Insulation Material	***Not Applicable***
Insulation Thickness (inch)	***Not Applicable***	Internal Finish	***Note 3***
		External Finish	***Note 4***

Notes

* To be determined by the vendor.

Note 1: Nozzle necks below normal operating level are Primary, others Auxiliary. See PVDF and vessel drawing for NDT. 1

Note 3: Descale all internal welds as laid, grind smooth and blend all starts/stops, high spots, and crevices, finish welds as required for NDE purposes. 1

Note 4: Welds descaled as laid. 1

Note 5: Maximum carbon content of 0.030%.

Note 6: 0.125 inch thick SB443 625 explosion bonded cladding on concave surface. 1

1 ***Note 7: Spiral wound, 316SS, flexible graphite fill, 1/8" thick.***

Equipment Cyclic Data Sheet

Component Plant Item Number:	***RLD-VSL-00004***
Component Description	***Parent Vessel***

The information below is provisional and envelopes operational duty for fatigue assessment. It is not to be used as operational data.

Materials of Construction	***SA-240 316***
Design Life	***40 Years***
Component Function and Life Cycle Description	***This tank collects drains liquid from the plant. Approximately twice a week the contents are pumped out. The pressure over the liquid is the Vessel Vent extraction depression.***

Load Type		Min	Max	Number of Cycles	Comment
Design Pressure	psig	***FV***	***15***	***10***	***Nominal Assumption***
Operating Pressure	psig	***-0.1*** 1	***0.07***	***4160***	***2 cycles per week for forty years***
Operating Temperature	°F	***59***	***158***	***4160***	***Coincident with pressure cycles. Adjacent locations <50° F range.***
Contents Specific Gravity		***1.47*** 1			
Contents Level	inch	***Empty***	***Op Vol***	***4160***	
Localized Features					
Nozzles					
Supports					

Notes

- ***Cycle increase: The Seller must increase the numbers of operational cycles given above by 10% to account for commissioning duty unless otherwise noted.***

R10505703

MECHANICAL DATA SHEET: VESSEL

PLANT ITEM No.
24590-LAW-MV-RLD-VSL-00005

Project	***RPP-WTP***	P&ID	***24590-LAW-M6-RLD-P0001***
Project No	***24590***	Process Data Sheet	***Deleted*** 2
Project Site	***Hanford***	Vessel Drawing	***24590-LAW-MV-RLD-P0003***
Description	***SBS Condensate Collection Vessel***		

Reference Data

Charge Vessels (Plant Item Numbers)	***Not Applicable***
Pulsejet Mixers (Plant Item Numbers)	***Not Applicable***

Design Data

Quality Level		***CM***	Fabrication Specs	***24590-WTP-3PS-MV00-TP001***		
Seismic Category		***SC-III*** 2	Design Code	***ASME VIII Div 1***		
Service/Contents		***SBS Purge Effluents***	Code Stamp	***Yes***		
			NB Registration	***Yes***		
Design Specific Gravity		***1 to 1.38***	Weights (lbs)	Empty	Operating	Test
Operating Volume	gal	***23400***	*Estimated*	***67,700***	***348,800***	***283,000***
Total Volume	gal	***25780***	*Actual* *			

Inside Diameter	inch	***192***			Wind Design	***Not Required***	
Length/Height	inch	***185 (See Vessel Drawing)***			Snow Design	***Not Required***	
		Vessel Operating	Vessel Design	Coil/Jacket Design	Seismic Design	***24590-WTP-3PS-FB01-T0001*** ***24590-WTP-3PS-MV00-TP002***	
Internal Pressure	psig	***0***	***15***	***N/A***	Seismic Base Moment *	ft*lb	
External Pressure	psig	***2.6***	***15 (FV)***	***N/A***	Postweld Heat Treat	***Not Required***	
Temperature	°F	***167***	***200***	***N/A***	Corrosion Allowance	inch	***0.04***
Min. Design Metal Temp.	°F	***40***			Hydrostatic Test Pressure *	psig	

Note: Please note that source, special nuclear and byproduct materials, as defined in the Atomic Energy Act of 1954 (AEA), are regulated at the U.S. Department of Energy (DOE) facilities exclusively by DOE acting pursuant to its AEA authority. DOE asserts, that pursuant to the source, special nuclear, and byproduct materials at DOE-owned nuclear facilities. Information contained herein on radionuclides is provided for process description purposes only.

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REV	**DATE**	**REASON FOR REVISION**	**PREPARER**	**CHECKER**	**REVIEWER**	**APPROVER**

	MECHANICAL DATA SHEET: VESSEL	PLANT ITEM No. 24590-LAW-MV-RLD-VSL-00005

Materials of Construction

Component	Material	Minimum Thickness / Size	Containment
Top Head and Top Head Nozzle Re-pads	***SA240 316/SA182 F316 with max Carbon of 0.030%***	***See Drawing***	***Auxiliary***
Top Head Nozzles N01, N02, N02A, N03, N03A, N04, N05, N09, N11, N15, N16, N16A, N18, N19, N20, and N20A 2	***SB688 UNS N08367 or SB622 N10276 Seamless*** 2	***See Drawing***	***Auxiliary, Note-1***
Top Head Nozzles N06, N07, N08, N10, and N17	***SA240 316/SA182 F316 with max Carbon of 0.030 %*** 2	***See Drawing***	***Auxiliary, Note-1***
Top Head Nozzles N12, N13, and N14 2	***SB622 N10276 Seamless*** 2	***See Drawing***	***Auxiliary, Note-1***
Shell 2	***SB688 UNS N08367*** 2	***See Drawing***	***Primary, Note-1***
Bottom Head	***SB688 UNS N08367***	***See Drawing***	***Primary***
Support 2	***SA240 304 with max Carbon of 0.030%*** 2	***See Drawing***	***N/A***
Internals	***UNS N08367***	***See Drawing***	***Primary***
"O" Ring Flanges	***UNS N08367***	***See Drawing***	***As Note-1 for Nozzle Necks***
"O" Ring Gaskets 2	***Parker E0540-80*** 2	***See Drawing***	***As Note-1 for Nozzle Necks***
Flat Gaskets 2	***EPDM*** 2		
Bolting (For Flanges)	***A193 Gr. B8 Cl. 1***	***See Drawing***	***N/A***

Miscellaneous Data

Orientation	***Vertical***	Support Type	***Skirt***
Insulation Function	***Not Applicable***	Insulation Material	***Not Applicable***
Insulation Thickness (inch)	***Not Applicable***	Welds Surface Finish	***De-scaled as Laid***

Notes

* To be determined by the vendor.

Note 1: Nozzle necks below the high operating liquid level are Primary, others Auxiliary.

Note 2: NDE for this vessel must meet requirements per paragraph 6.4.2 of 24590-WTP-3PS-MV00-TP001.

Note 3: This vessel is not subjected to thermal cycling or pressure cycling.

Note 4: Vessel volumes are approximate and do not account for manufacturing tolerances, nozzles, and displacement of internals.

Note 5: Contents of this document are Dangerous Waste Permit affecting.

MECHANICAL DATA SHEET: VESSEL

PLANT ITEM No.
24590-LAW-MV-RLD-VSL-00003

ISSUED BY RPP-WTP PDC 11/26/03 INIT DATE

R10171875

Project	***RPP-WTP***	P&ID	***24590-LAW-M6-RLD-P0001***
Project No	***24590***	Process Data Sheet	***24590-LAW-MVD-RLD-00003***
Project Site	***Hanford***	Vessel Drawing	***24590-LAW-MV-RLD-P0002***
Description	***Plant Wash Vessel***		

Reference Data

Charge Vessels (Plant Item Numbers)	***Not Applicable***
Pulsejet Mixers (Plant Item Numbers)	***Not Applicable***

Design Data

Quality Level		***CM***	Fabrication Specs	***24590-WTP-3PS-MV00-TP001***		
Seismic Category		***SC-3***	Design Code	***ASME VIII Div 1***		
Service/Contents		***Wash/Drain Effluent***	Code Stamp	***Yes***		
			NB Registration	***Yes***		
Design Specific Gravity		***1 to 1.38***	Weights (lbs)	Empty	Operating	Test
Operating Volume	gal	***23400***	Estimated	**70,100**	**351,200**	**285,500**
Total Volume	gal	***25780***	Actual *			

Inside Diameter	inch	***192***			Wind Design	***Not Required***	
Length/Height	inch	***185 (See Vessel Drawing)***			Snow Design	***Not required***	
		Vessel Operating	Vessel Design	Coil/Jacket Design	Seismic Design	***24590-WTP-3PS-FB01-T0001***	
						24590-WTP-3PS-MV00-TP002	
Internal Pressure	psig	***0***	***15***	***N/A***	Seismic Base Moment *	ft*lb	
External Pressure	psig	***3.61***	***15 (FV)***	***N/A***	Postweld Heat Treat	***Not required***	
Temperature	°F	***167***	***200***	***N/A***	Corrosion Allowance	inch	***0.04***
Min. Design Metal Temp.	°F	***-23***			Hydrostatic Test Pressure *	psig	

Please note that source, special nuclear and byproduct materials, as defined in the Atomic Energy Act of 1954 (AEA), are regulated at the U.S. Department of Energy (DOE) facilities exclusively by DOE acting pursuant to its AEA authority. DOE asserts that pursuant to the AEA, it has sole and exclusive responsibility and authority to regulate source, special nuclear, and byproduct materials at DOE-owned nuclear facilities. Information contained herein on radionuclides is provided for process description purposes only.

ERIC B. ISERN STATE OF WASHINGTON 33449 REGISTERED PROFESSIONAL ENGINEER
11/25/03
EXPIRES: 07/28/05

This Bound Document Contains a total of 2 pages

REV	DATE	REASON FOR REVISION	PREPARER	CHECKER	REVIEWER	APPROVER
2	11/25/03	Issued for Permitting Use				for M. Hoffmann
1	11/17/03	Issued for Permitting Use	Jessica Jackson	Cliff Slater		Mark Hoffmann
0	9/17/02	Issued for Permitting Use	Jessica Jackson	Cliff Slater		Suzanne Kirk

11/26/03 11/26/03
Processed/ Data Entry | Copied/ QA | Scanned | Filed

Materials of Construction

Component	Material	Minimum Thickness / Size	Containment
Top Head	***SA240 316 with max Carbon of 0.030%***	***See Drawing***	***Auxiliary***
Top Head Nozzles with Dip Pipe (Nozzles N20, N22A and N24 only)	***SB688 UNS N08367 or SB622 N10276***	***See Drawing***	***Auxiliary***
Top Head Nozzles without Dip Pipe	***SA240 316/SA182 F316 with max Carbon of 0.030%***	***See Drawing***	***Auxiliary***
Shell & Shell Nozzles N01 and N26	***SB688 UNS N08367 or SB622 N10276***	***See Drawing***	***Primary***
Bottom Head	***UNS N08367***	***See Drawing***	***Primary***
Support	***SA240 304 with max Carbon of 0.030%***	***See Drawing***	***N/A***
Jacket/Coils/Half-Pipe Jacket	***N/A***	***N/A***	***N/A***
Internals excl. Sprayers	***UNS N08367***	***See Drawing***	***N/A***
Sprayers	***316 SS***	***See Drawing***	***N/A***
"O" Ring Flanges for Top Head Nozzles	***SA182 F316 with max Carbon of 0.030%***	***See Drawing***	***N/A***
"O" Ring and Flat Gaskets	***EPDM***	***See Drawing***	***N/A***
Bolting (For Flanges)	***A193 Gr. B8 Cl.1***	***See Drawing***	***N/A***

Miscellaneous Data

Orientation	***Vertical***	Support Type	***Skirt***
Insulation Function	***Not Applicable***	Insulation Material	***Not Applicable***
Insulation Thickness (inch)	***Not Applicable***	Welds Surface Finish	***De-scaled as laid***

Notes

* To be determined by the vendor.

Note 1: Nozzle necks below the high operating liquid level are Primary, others Auxiliary.

Note 2: NDE for this vessel must meet requirements per para. 6.4.2 of specification no. 24590-WTP-3PS-MV00-TP001.

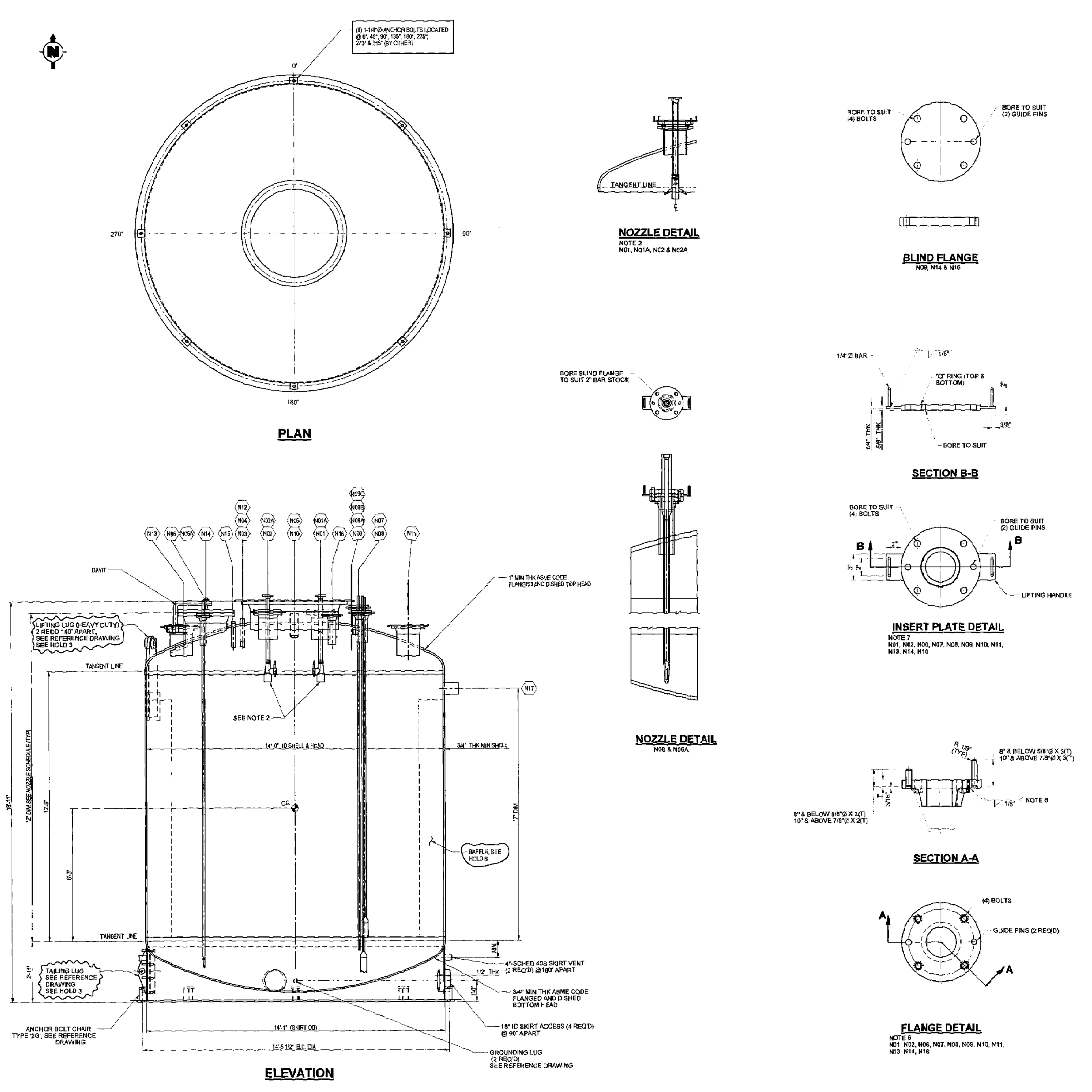
Note 3: This vessel is not subjected to thermal cycling or pressure cycling.

Note 4: Vessel volumes are approximate and do not account for manufacturing tolerances, nozzles, and displacement of internals

Note 5: Contents of this document are Dangerous Waste Permit affecting.

Note 6: Incorporated 24590-WTP-SDDR-PROC-03-0322 by design. Revised vessel external operating pressure. Other revisions for consistency.

NOZZLE	SIZE	SCHED/WALL	SERVICE/REMARKS	"Z" DIM	REF DWG-DET	CONN PIPE SIZE/SCHED
N01	10"	80S	SPRAY NOZZLE LCP-NOZ-00001	15'-8"	24590-WTP-MV-M59T-00016001 DET 9	BLIND FLANGE
N01A	2"	160S	INLET TO SPRAY NOZZLE	16'-4"	24590-WTP-MV-M59T-00016001 DET 10	FLANGED
N02	10"	80S	SPRAY NOZZLE LCP-NOZ-00002	15'-8"	24590-WTP-MV-M59T-00016001 DET 9	BLIND FLANGE
N02A	2"	160S	INLET TO SPRAY NOZZLE	16'-4"	24590-WTP-MV-M59T-00016001 DET 10	FLANGED
N03	3"	80S	FEED CONCENTRATE INLET	15'-3"	24590-WTP-MV-M59T-00016001 DET 2	3"-40S
N04	2"	160S	SAMPLE RETURN	15'-3"	24590-WTP-MV-M59T-00016001 DET 2	2"-80S
N05	4"	80S	VENT	15'-6"	24590-WTP-MV-M59T-00016001 DET 1	4"-40S
N06	3"	80S	THERMOWELL FLANGE	15'-1"	24590-WTP-MV-M59T-00016001 DET 9	BLIND FLANGE
N06A	1"	160S	THERMOWELL	15'-10"	24590-WTP-MV-M59T-00007 DET 7	3/4" NPT
N07	10"	80S	INSTRUMENT (LEVEL/RADAR)	15'-9"	24590-WTP-MV-M59T-00016003 DET 25	FLANGED
N08	10"	80S	INSTRUMENT (LEVEL RADAR)	15'-9"	24590-WTP-MV-M59T-00016003 DET 25	FLANGED
N09	6"	80S	INSTRUMENTATION	15'-7"	24590-WTP-MV-M59T-00016003 DET 27	BLIND FLANGE
N09A	1"	160S	BALANCE	15'-9"	24590-WTP-MV-M59T-00016003 DET 27	1"-40S
N09B	1"	160S	DENSITY	15'-10"	24590-WTP-MV-M59T-00016003 DET 27	1"-40S
N09C	1"	160S	LEVEL	15'-11"	24590-WTP-MV-M59T-00016003 DET 27	1"-40S
N10	50" ID	PLATE	AGITATOR LCP-AGT-00001	16'-1"	24590-WTP-MV-M59T-00016001 DET 9	FLANGED NOTE 9
N11	20" ID	40S	PUMP LCP-PMP-00001A	14'-11"	24590-WTP-MV-M59T-00016001 DET 9	FLANGED NOTE 10
N12	2"	160S	RECIRCULATION	15'-3"	24590-WTP-MV-M59T-00016001 DET 2	2"-80S
N13	20" ID	40S	PUMP LCP-PMP-00001B	14'-11"	24590-WTP-MV-M59T-00016001 DET 9	FLANGED NOTE 10
N14	24"	PLATE	MANWAY	15'-6"	24590-WTP-MV-M59T-00017 DET 2	BLIND FLANGE W/ DAVIT
N15	2"	160S	SPARE	15'-1"	24590-WTP-MV-M59T-00016001 DET 2	CAPPED
N16	4"	80S	SPARE	15'-5"	24590-WTP-MV-M59T-00016001 DET 9	BLIND FLANGE
N17	6"	160S	OVERFLOW	12'-1"	24590-WTP-MV-M59T-00016001 DET 1	6"-40S



GENERAL NOTES:

1. ALL FLANGE BOLT HOLES SHALL STRADDLE VESSEL NORMAL VESSEL CENTERLINE.
2. SELLER TO PROVIDE THE INTERNAL SPRAY NOZZLE (MODEL GAMAJET VIII) FOR NOZZLE N01 & N02. SPRAY NOZZLE PIPE TO BE WELDED ON THE BLIND FLANGE AND REMOVABLE.
3. ALL "Z" DIMENSIONS MEASURED FROM THE BOTTOM TANGENT LINE UNLESS OTHERWISE NOTED. FOR SHELL NOZZLE "Z" DIMENSIONS MEASURED FROM CENTER LINE OF NOZZLE.
4. FOR DISTANCE OF DIP PIPES (LEGS) TO BOTTOM HEAD USE 2" CLEARANCE UNLESS OTHERWISE SPECIFIED.
5. SELLER TO PROVIDE NECESSARY SUPPORT/GUIDE SYSTEM FOR INTERNAL PARTS, PUMPS & AGITATOR NOZZLES.
6. USE STANDARD ASME 150# WNFF FLANGE & BLIND FLANGE DIMENSIONS WITH THE EXCEPTION OF ONLY 4 BOLTS AND 2 GUIDE PINS. SEE FLANGE DETAIL.
7. GASKET IS BY AN INSERT PLATE HAVING TWO CAPTIVE O-RINGS. INSERT PLATE DIMENSIONS SHALL MATCH THE FLANGE. SEE INSERT PLATE DETAIL. INSERT PLATES SHALL BE TAGGED WITH THE PLANT ITEM NUMBER AND NOZZLE NUMBER AND SHIPPED WITH THE VESSEL.
8. WELD NUTS TO FLANGE.
9. SELLER TO DESIGN/ANALYZE THE AGITATOR NOZZLE N10 BASED ON THE FOLLOWING:

STATIC WEIGHT (lb.)	3,000
MAX TORQUE (in. lb.)	8,300
MAX ALLOWABLE TORQUE (in. lb.)	40,000
VERTICAL DOWN FORCE (lb.)	9,000
DYNAMIC TORQUE (in. lb.)	30,000
WEIGHT MOMENT (in. lb.)	8,300
BENDING MOMENT (in. lb.)	50,000
HP/SPEED/ROTATION	15/84/CW

10. SELLER TO DESIGN/ANALYZE PUMP NOZZLES N11 AND N13 BASED ON THE FOLLOWING:

AXIAL DOWNWARD THRUST (lb.)	1,340
BENDING MOMENT (in. lb.)	210
MAX TORQUE (in. lb.)	1,260
PROJECTED WT (IN EMPTY VESSEL) INCLUDING MOTOR (lbs.)	3650

11. SELLER TO ORIENT THE LIFTING HANDLE TO AVOID INTERFERENCE WITH OTHER NOZZLES.

HOLDS:

1. NOZZLE LOCATIONS, SIZE AND "Z" DIMENSIONS PENDING CONFIRMATION ON AGITATOR AND VERTICAL PUMPS SIZE.
2. LOCATION FOR NAMEPLATE & BRACKET, SKIRT VENT AND SKIRT OPENING PENDING PIPING DESIGN BY PLANT DESIGN.
3. LOCATION FOR LIFTING LUGS AND TAILING LUG PENDING REVIEW BY CONSTRUCTION.
4. DELETED
5. GROUNDING LUG LOCATION PENDING REVIEW BY ELECTRICAL.
6. AGITATOR AND PUMP NOZZLES SIZE, DYNAMIC / STATIC LOADS, QTY, SIZE AND LOCATION OF BAFFLE PLATE PENDING CONFIRMATION FROM ROTATING EQUIPMENT GROUP.

PLEASE NOTE THAT SOURCE, SPECIAL NUCLEAR AND BYPRODUCT MATERIALS, AS DEFINED IN THE ATOMIC ENERGY ACT OF 1954 (AEA), ARE REGULATED AT THE US DEPARTMENT OF ENERGY (DOE) FACILITIES EXCLUSIVELY BY DOE ACTING PURSUANT TO ITS AEA AUTHORITY. DOE ASSERTS, THAT PURSUANT TO THE AEA, IT HAS SOLE AND EXCLUSIVE RESPONSIBILITY AND AUTHORITY TO REGULATE SOURCE, SPECIAL NUCLEAR, AND BYPRODUCT MATERIALS AT DOE-OWNED NUCLEAR FACILITIES. INFORMATION CONTAINED HEREIN ON RADIONUCLIDES IS PROVIDED FOR PROCESS DESCRIPTION PURPOSES ONLY.

THIS DRAWING TO BE READ IN CONJUNCTION WITH MECHANICAL DATA SHEET 24590-LAW-MVD-LCP-P0004

QUALITY LEVEL DESIGNATION FOR ALL COMPONENTS OF THIS VESSEL IS CM

REFERENCE DRAWINGS

DWG NO	REV	TITLE
24590-LAW-M6-LCP-P0001	0	P&ID
24590-WTP-MV-M59T-00301	1	PRESSURE VESSEL TOLERANCES STANDARD DETAILS
24590-WTP-MV-M59T-00307	1	THERMOWELL CONNECTION STANDARD DETAILS
24590-WTP-MV-M59T-00309	1	LIFTING LUGS STANDARD DETAILS
24590-WTP-MV-M59T-00310	1	TAILING LUG STANDARD DETAILS
24590-WTP-MV-M59T-00312	1	GROUNDING LUG STANDARD DETAILS
24590-WTP-MV-M59T-00016001	2	VESSEL CONNECTIONS STANDARD DETAILS SHT 1 OF 3
24590-WTP-MV-M59T-00016002	1	VESSEL CONNECTIONS STANDARD DETAILS SHT 2 OF 3
24590-WTP-MV-M59T-00016003	0	VESSEL CONNECTIONS STANDARD DETAILS SHT 3 OF 3
24590-WTP-MV-M59T-00017	1	VESSEL INSPECTION MANWAY STANDARD DETAILS
24590-WTP-MV-M59T-00018	1	VESSEL NAME PLATE STANDARD DETAILS
24590-WTP-MV-M59T-00026	1	ANCHOR BOLT CHAIR DETAILS FOR VERTICAL VESSELS

REGISTERED PROFESSIONAL ENGINEER 35449 — EXPIRES: 07/26/05

REV	DESCRIPTION	ORG	CHKD	RVWD	APVD	DATE
0	ISSUED FOR PERMITTING USE					12/29/03

REVISION HISTORY

CM QUALITY LEVEL

ISSUED BY RPP-WTP PDC — ISSUE STAMP

PROJECT No.	24590
SITE	HANFORD
AREA	20E
BUILDING No.	20

RIVER PROTECTION PROJECT
WASTE TREATMENT PLANT
2435 STEVENS CENTER PLACE
RICHLAND, WA 99352

CONTRACT No: DE-AC27-01RV14136

	BY	DATE
ORIGINATOR		11/12/03
CHECKER		11/12/03
APPROVER		12/29/03
REVIEWER		11/12/03

CONTENT APPLICABLE TO ALARA? YES NO
ADR NO. REV:
DIM REFERENCE No.

EQUIPMENT ASSEMBLY CONCENTRATE RECEIPT VESSEL LCP-VSL-00001

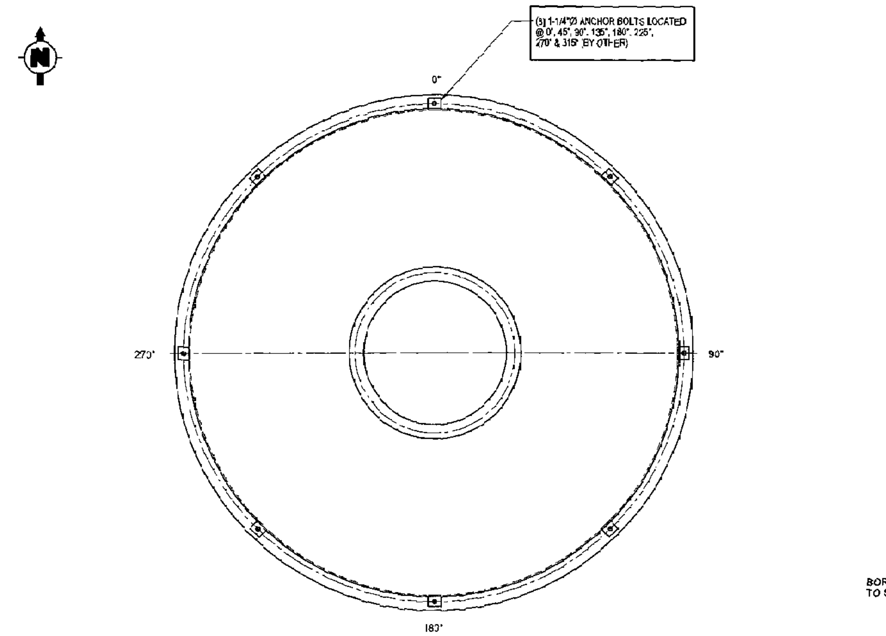
SCALE: NONE

24590-LAW-MV-LCP-P0001 REV 0

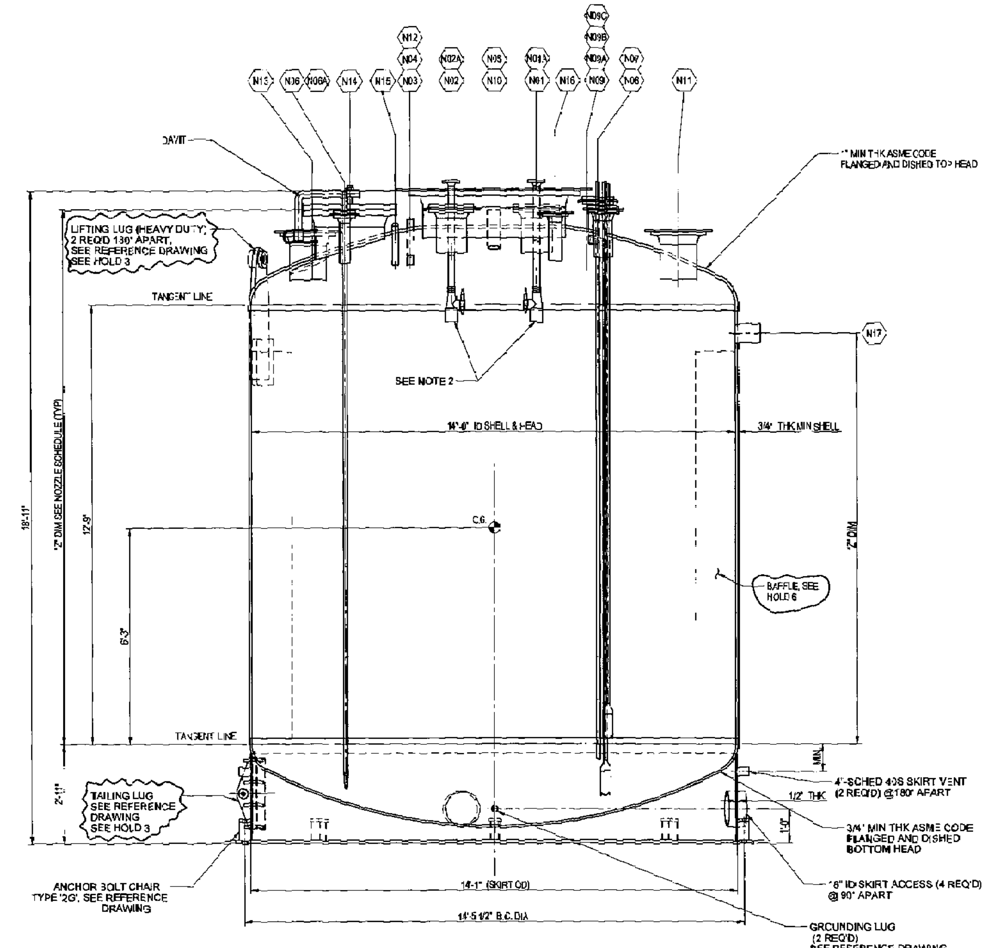
'E' SIZE - 44x34
COMPUTER GENERATED BY SOLID EDGE. MANUAL CHANGES NOT PERMITTED
WHEN REFERENCING DRAWING AND DIM NUMBERS IN DOCUMENTS, BE SURE TO INCLUDE DASHES BETWEEN ELEMENTS
11/03/2003 12:48 PM

FORM E_MASTER 03/2002

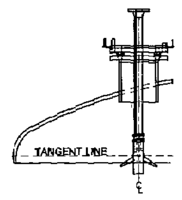
NOZZLE	SIZE	SCHED WALL	SERVICE/REMARKS	"Z" DIM	REF DWG-DET	CONN PIPE SIZED/SCHED
N01	10"	80S	SPRAY NOZZLE LCP-NOZ-00003	15'-8"	24590-WTP-MV-M59T-00016001 DET 9	BLIND FLANGE
N01A	2"	160S	INLET TO SPRAY NOZZLE	13'-4"	24590-WTP-MV-M59T-00016001 DET 10	FLANGED
N02	10"	80S	SPRAY NOZZLE LCP-NOZ-00004	15'-8"	24590-WTP-MV-M59T-00016001 DET 9	BLIND FLANGE
N02A	2"	160S	INLET TO SPRAY NOZZLE	13'-4"	24590-WTP-MV-M59T-00016001 DET 10	FLANGED
N03	3"	80S	FEED CONCENTRATE INLET	15'-3"	24590-WTP-MV-M59T-00016001 DET 2	3"-40S
N04	2"	160S	SAMPLE RETURN	15'-3"	24590-WTP-MV-M59T-00016001 DET 2	2"-80S
N05	4"	80S	VENT	15'-6"	24590-WTP-MV-M59T-00016001 DET 1	4"-40S
N06	3"	80S	THERMOWELL FLANGE	15'-1"	24590-WTP-MV-M59T-00016001 DET 9	BLIND FLANGE
N06A	1"	160S	THERMOWELL	15'-10"	24590-WTP-MV-M59T-00007 DET 7	3/4" NPT
N07	10"	80S	INSTRUMENT (LEVEL/RADAR)	15'-8"	24590-WTP-MV-M59T-00016003 DET 25	FLANGED
N08	10"	80S	INSTRUMENT (LEVEL RADAR)	15'-8"	24590-WTP-MV-M59T-00016003 DET 25	FLANGED
N09	6"	80S	INSTRUMENTATION	15'-7"	24590-WTP-MV-M59T-00016003 DET 27	BLIND FLANGE
N09A	1"	160S	BALANCE	15'-9"	24590-WTP-MV-M59T-00016003 DET 27	1"-40S
N09B	1"	160S	DENSITY	15'-10"	24590-WTP-MV-M59T-00016003 DET 27	1"-40S
N09C	1"	160S	LEVEL	15'-11"	24590-WTP-MV-M59T-00016003 DET 27	1"-40S
N10	50"ID	PLATE	AGITATOR LCP-AGT-00002	13'-1"	24590-WTP-MV-M59T-00016001 DET 9	FLANGED NOTE 9
N11	20"ID	40S	PUMP LCP-PMP-00002A	14'-11"	24590-WTP-MV-M59T-00016001 DET 9	FLANGED NOTE 10
N12	2"	160S	RECIRCULATION	15'-3"	24590-WTP-MV-M59T-00016001 DET 2	2"-80S
N13	20"ID	40S	PUMP LCP-PMP-00002B	14'-11"	24590-WTP-MV-M59T-00016001 DET 9	FLANGED NOTE 10
N14	24"	PLATE	MANWAY	15'-8"	24590-WTP-MV-M59T-00017 DET 2	BLIND FLANGE W/ DAVIT
N15	2"	160S	SPARE	15'-1"	24590-WTP-MV-M59T-00016001 DET 2	CAPPED
N16	4"	80S	SPARE	15'-5"	24590-WTP-MV-M59T-00016001 DET 9	BLIND FLANGE
N17	6"	160S	OVERFLOW	12'-1"	24590-WTP-MV-M59T-00016001 DET 1	6"-40S



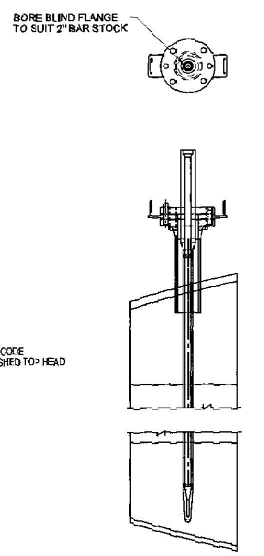
PLAN



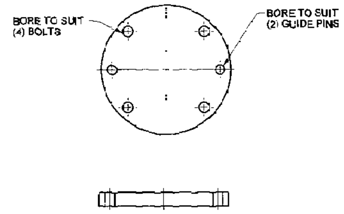
ELEVATION



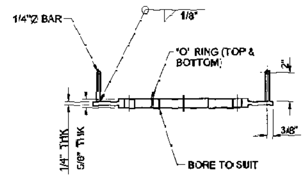
NOZZLE DETAIL
NOTE 2
N01, N01A, N02 & N02A



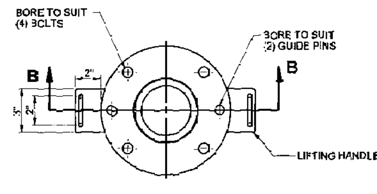
NOZZLE DETAIL
N06 & N06A



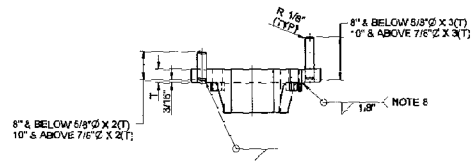
BLIND FLANGE
N09, N14 & N16



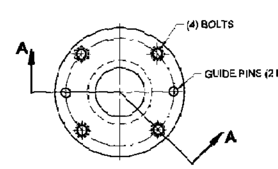
SECTION B-B



INSERT PLATE DETAIL
NOTE 7
N01, N02, N06, N07, N08, N09, N10, N11, N13, N14, N16



SECTION A-A



FLANGE DETAIL
NOTE 6
N01, N02, N06, N07, N08, N09, N10, N11, N13, N14, N16

GENERAL NOTES:

1. ALL FLANGE BOLT HOLES SHALL STRADDLE VESSEL NORMAL VESSEL CENTER-LINE.
2. SELLER TO PROVIDE THE INTERNAL SPRAY NOZZLE (MODEL GAMAJET VIII) FOR NOZZLE N01 & N02. SPRAY NOZZLE PIPE TO BE WELDED ON THE BLIND FLANGE AND REMOVABLE.
3. ALL "Z" DIMENSIONS MEASURED FROM THE BOTTOM TANGENT LINE UNLESS OTHERWISE NOTED. FOR SHELL NOZZLE, "Z" DIMENSIONS MEASURED FROM CENTER LINE OF NOZZLE.
4. FOR DISTANCE OF DIP PIPES (LEGS) TO BOTTOM HEAD USE 2" CLEARANCE UNLESS OTHERWISE SPECIFIED.
5. SELLER TO PROVIDE NECESSARY SUPPORT/GUIDE SYSTEM FOR INTERNAL PARTS, PUMPS & AGITATOR NOZZLES.
6. USE STANDARD ASME 150# WNFF FLANGE & BLIND FLANGE DIMENSIONS WITH THE EXCEPTION OF ONLY 4 BOLTS AND 2 GUIDE PINS. SEE FLANGE DETAIL.
7. GASKET IS BY AN INSERT PLATE HAVING TWO CAPTIVE O-RINGS. INSERT PLATE DIMENSIONS SHALL MATCH THE FLANGE. SEE INSERT PLATE DETAIL. INSERT PLATES SHALL BE TAGGED WITH THE PLANT ITEM NUMBER AND NOZZLE NUMBER AND SHIPPED WITH THE VESSEL.
8. WELD NUTS TO FLANGE.
9. SELLER TO DESIGN/ANALYZE THE AGITATOR NOZZLE N10 BASED ON THE FOLLOWING:

STATIC WEIGHT (lb.)	3,000
MAX TORQUE (in. lb.)	8,300
MAX ALLOWABLE TORQUE (in. lb.)	40 000
VERTICAL DOWN FORCE (lb.)	9 000
DYNAMIC TORQUE (in. lb.)	30,000
WEIGHT MOMENT (in. lb.)	8,300
BENDING MOMENT (in. lb.)	50 000
HP/SPEED/ROTATION	15/84/CW

10. SELLER TO DESIGN/ANALYZE PUMP NOZZLES N11 AND N13 BASED ON THE FOLLOWING:

AXIAL DOWNWARD THRUST (lb.)	1 340
BENDING MOMENT (in. lb.)	210
MAX TORQUE (in. lb.)	1 260
PROJECTED WT (IN EMPTY VESSEL) INCLUDING MOTOR (lbs.)	3850

11. SELLER TO ORIENT THE LIFTING HANDLE TO AVOID INTERFERENCE WITH OTHER NOZZLES.

HOLDS:

1 NOZZLE LOCATIONS, SIZE AND "Z" DIMENSIONS PENDING CONFIRMATION ON AGITATOR AND VERTICAL PUMPS SIZE.
2 LOCATION FOR NAMEPLATE & BRACKET, SKIRT VENT AND SKIRT OPENING PENDING PIPING DESIGN BY PLANT DESIGN.
3 LOCATION FOR LIFTING LUGS AND TAILING LUG PENDING REVIEW BY CONSTRUCTION.
4 DELETED.
5 GROUNDING LUG LOCATION PENDING REVIEW BY ELECTRICAL.
6 AGITATOR AND PUMP NOZZLES SIZE, DYNAMIC / STATIC LOADS, QTY, SIZE AND LOCATION OF BAFFLE PLATE PENDING CONFIRMATION FROM ROTATING EQUIPMENT GROUP.

THIS DRAWING TO BE READ IN CONJUNCTION WITH MECHANICAL DATA SHEET 24590-LAW-MVD-LCP-P0005

QUALITY LEVEL DESIGNATION FOR ALL COMPONENTS OF THIS VESSEL IS CM

PLEASE NOTE THAT SOURCE, SPECIAL NUCLEAR AND BYPRODUCT MATERIALS, AS DEFINED IN THE ATOMIC ENERGY ACT OF 1954 (AEA) ARE REGULATED AT THE U.S. DEPARTMENT OF ENERGY (DOE) FACILITIES EXCLUSIVELY BY DOE ACTING PURSUANT TO ITS AEA AUTHORITY. DOE ASSERTS, THAT PURSUANT TO THE AEA, IT HAS SOLE AND EXCLUSIVE RESPONSIBILITY AND AUTHORITY TO REGULATE SOURCE, SPECIAL NUCLEAR, AND BYPRODUCT MATERIALS AT DOE-OWNED NUCLEAR FACILITIES. INFORMATION CONTAINED HEREIN ON RADIONUCLIDES IS PROVIDED FOR PROCESS DESCRIPTION PURPOSES ONLY.

REFERENCE DRAWINGS

DWG NO	REV	TITLE
24590-LAW-M6-LCP-P0002	0	P&ID
24590-WTP-MV-M59T-00001	1	PRESSURE VESSEL TOLERANCES STANDARD DETAILS
24590-WTP-MV-M59T-00007	1	THERMOWELL CONNECTION STANDARD DETAILS
24590-WTP-MV-M59T-00009	1	LIFTING LUGS STANDARD DETAILS
24590-WTP-MV-M59T-00010	1	TAILING LUG STANDARD DETAILS
24590-WTP-MV-M59T-00012	1	GROUNDING LUG STANDARD DETAILS
24590-WTP-MV-M59T-00016001	2	VESSEL CONNECTIONS STANDARD DETAILS SHT 1 OF 3
24590-WTP-MV-M59T-00016002	1	VESSEL CONNECTIONS STANDARD DETAILS SHT 2 OF 3
24590-WTP-MV-M59T-00016003	0	VESSEL CONNECTIONS STANDARD DETAILS SHT 3 OF 3
24590-WTP-MV-M59T-00017	1	VESSEL INSPECTION MANWAY STANDARD DETAILS
24590-WTP-MV-M59T-00018	1	VESSEL NAME PLATE STANDARD DETAILS
24590-WTP-MV-M59T-00026	1	ANCHOR BOLT CHAIR DETAILS FOR VERTICAL VESSELS

REV	DESCRIPTION	ORG	CHKD	RVWD	APVD	DATE
0	ISSUED FOR PERMITTING USE					

REVISION HISTORY

CM
QUALITY LEVEL

PROJECT No. 24590
SITE HANFORD
AREA 2WE
BUILDING No. 20

RIVER PROTECTION PROJECT
WASTE TREATMENT PLANT
2435 STEVENS CENTER PLACE
RICHLAND, WA 99352

CONTRACT No: DE-AC27-01RV14136

		DATE
ORIGINATOR		11/05/03
CHECKER		11/05/03
APPROVER		11/06/03
REVIEWER		11/6/03

EQUIPMENT ASSEMBLY
CONCENTRATE RECEIPT VESSEL
LCP-VSL-00002

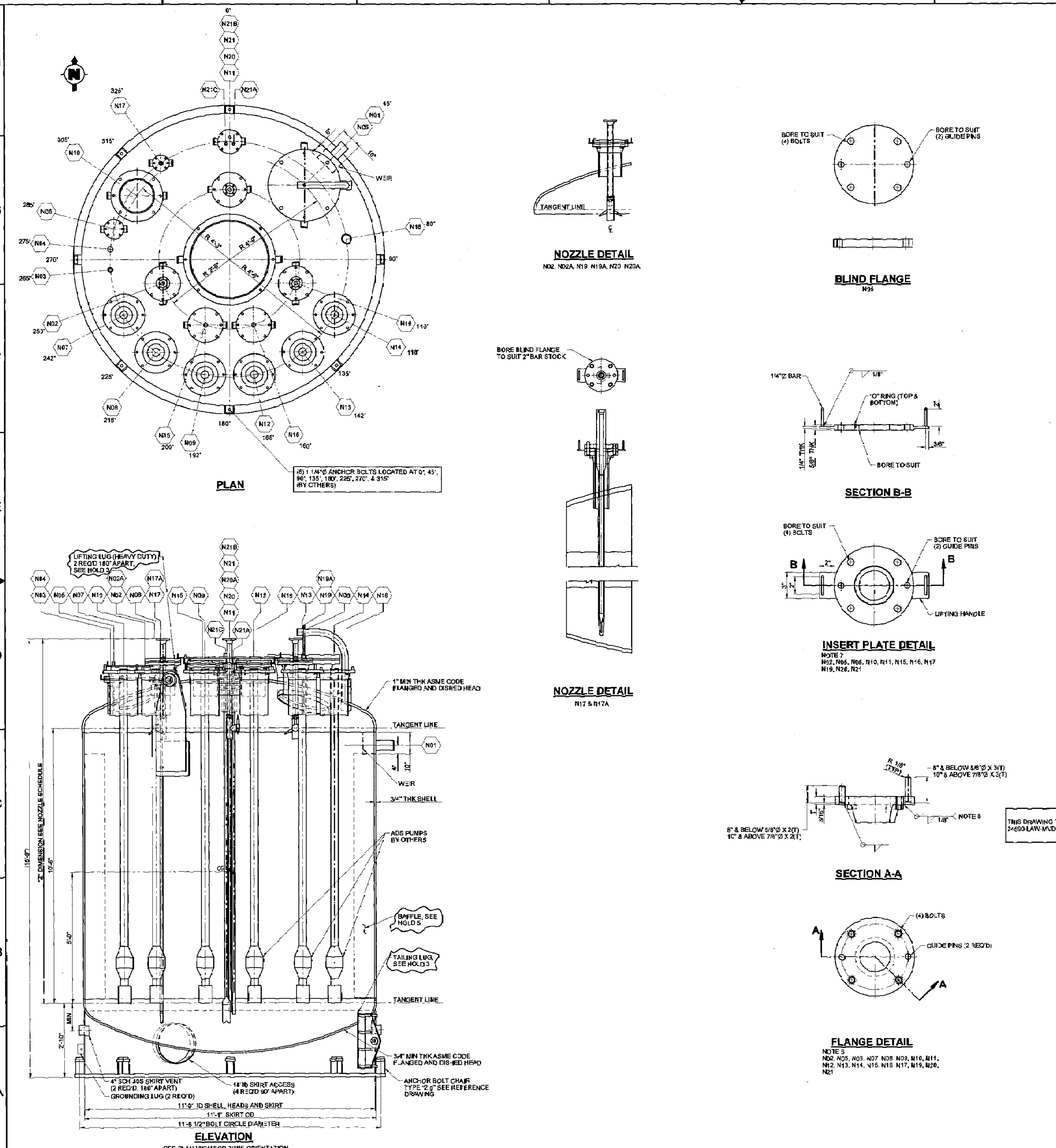
CONTENT APPLICABLE TO ALARA? ☐ YES ☐ NO
ADR No: REV:
DM REFERENCE No:

SCALE: NONE

24590-LAW-MV-LCP-P0002 REV 0

"E" SIZE - 44x34
COMPUTER GENERATED BY SOLID EDGE. MANUAL CHANGES NOT PERMITTED

WHEN REFERENCING DRAWINGS AND DM NUMBERS IT IS CONVENIENT TO ALWAYS BE SURE TO INCLUDE DASHES BETWEEN ELEMENTS



NOZZLE	SIZE	SCHED/WALL	SERVICE/REMARKS	"Z" DIM	REF DWG - DET	CONN. PIPE - SCHED
N01	4"	80S	OVERFLOW	9'-10"	24590-WTP-MV-M59T-00016001 DET 1	4"- 40S
N02	10"	80S	SPRAY NOZZLE LFP-NOZ-00003	13'-0"	24590-WTP-MV-M59T-00016001 DET 9	BLIND FLANGE
N02A	2"	160S	INLET TO SPRAY NOZZLE	13'-11"	24590-WTP-MV-M59T-00016001 DET 10	FLANGED
N03	2"	160S	INLET	12'-4"	24590-WTP-MV-M59T-00016001 DET 2	2" - 80S
N04	2"	160S	INLET	12'-4"	24590-WTP-MV-M59T-00016001 DET 2	2"-80S
N05	4"	160S	SPARE	12'-4"	24590-WTP-MV-M59T-00016001 DET 9	BLIND FLANGE
N06	24"	PLATE	MANWAY	12'-11"	24590-WTP-MV-M59T-00017 DET 2	BLIND FLANGE W/DAVIT
N07	12"	80S	SLURRY FROM LFP-PMP-00010	12'-9"	24590-WTP-MV-M59T-00016001 DET 9	FLANGED, NOTE 10
N08	12"	80S	SLURRY FROM LFP-PMP-00009	12'-9"	24590-WTP-MV-M59T-00016001 DET 9	FLANGED, NOTE 10
N09	12"	80S	SLURRY FROM LFP-PMP-00007	12'-9"	24590-WTP-MV-M59T-00016001 DET 9	FLANGED, NOTE 10
N10	20" ID	40S	PUMP LFP-PMP-00002	12'-10"	24590-WTP-MV-M59T-00016001 DET 9	FLANGED, NOTE 11
N11	36" ID	PLATE	AGITATOR LFP-AGT-00002	13'-4"	24590-WTP-MV-M59T-00016001 DET 9	FLANGED, NOTE 9
N12	12"	80S	SLURRY FROM LFP-PMP-00008	12'-9"	24590-WTP-MV-M59T-00016001 DET 9	FLANGED, NOTE 10
N13	12"	80S	SLURRY FROM LFP-PMP-00011	12'-9"	24590-WTP-MV-M59T-00016001 DET 9	FLANGED, NOTE 10
N14	12"	80S	SLURRY FROM LFP-PMP-00012	12'-9"	24590-WTP-MV-M59T-00016001 DET 9	FLANGED, NOTE 10
N15	10"	40S	INSTRUMENT (LEVEL/RADAR)	12'-11"	24590-WTP-MV-M59T-00016003 DET 25	FLANGED
N16	10"	40S	INSTRUMENT (LEVEL/RADAR)	12'-11"	24590-WTP-MV-M59T-00016003 DET 25	FLANGED
N17	3"	80S	THERMOWELL FLANGE	12'-4"	24590-WTP-MV-M59T-00016001 DET 9	SEE DETAIL
N17A	1"	160S	THERMOWELL	13'-1"	24590-WTP-MV-M59T-00007 DET 7	3/4" NPT
N18	4"	80S	VENT	12'-4"	24590-WTP-MV-M59T-00016001 DET 8	4" - 40S
N19	10"	80S	SPRAY NOZZLE LFP-NOZ-00004	13'-0"	24590-WTP-MV-M59T-00016001 DET 9	BLIND FLANGE
N19A	2"	160S	INLET TO SPRAY NOZZLE	13'-11"	24590-WTP-MV-M59T-00016001 DET 10	FLANGED
N20	10"	80S	SPRAY NOZZLE LFP-NOZ-00005	13'-0"	24590-WTP-MV-M59T-00016001 DET 9	BLIND FLANGE
N20A	2"	160S	INLET TO SPRAY NOZZLE	13'-11"	24590-WTP-MV-M59T-00016001 DET 10	FLANGED
N21	6"	80S	INSTRUMENTATION	12'-6"	24590-WTP-MV-M59T-00016003 DET 27	BLIND FLANGE
N21A	1"	160S	BALANCE	13'-2"	24590-WTP-MV-M59T-00016003 DET 27	1" - 40S
N21B	1"	160S	DENSITY	13'-3"	24590-WTP-MV-M59T-00016003 DET 27	1" - 40S
N21C	1"	160S	LEVEL	13'-4"	24590-WTP-MV-M59T-00016003 DET 27	1" - 40S

GENERAL NOTES:

1. ALL FLANGE BOLT HOLES SHALL STRADDLE VESSEL NORMAL VESSEL CENTERLINE.
2. SELLER TO PROVIDE THE INTERNAL SPRAY NOZZLE (MODEL GAMAJET VIII) FOR NOZZLE N02, N19 & N20. SPRAY NOZZLE PIPE TO BE WELDED ON THE BLIND FLANGE AND REMOVABLE.
3. ALL "Z" DIMENSIONS MEASURED FROM THE BOTTOM TANGENT LINE UNLESS OTHERWISE NOTED. FOR SHELL NOZZLE, "Z" DIMENSIONS MEASURED FROM CENTER LINE OF NOZZLE.
4. FOR DISTANCE OF DIP PIPES (LEGS) TO BOTTOM HEAD USE 2" CLEARANCE UNLESS OTHERWISE SPECIFIED.
5. SELLER TO PROVIDE NECESSARY SUPPORT/GUIDE SYSTEM FOR INTERNAL PARTS, PUMPS & AGITATOR NOZZLES.
6. USE STANDARD ASME 150# WNFF FLANGE & BLIND FLANGE DIMENSIONS WITH THE EXCEPTION OF ONLY 4 BOLTS AND 2 GUIDE PINS. SEE FLANGE DETAIL.
7. GASKET IS BY AN INSERT PLATE HAVING TWO CAPTIVE O-RINGS. INSERT PLATE DIMENSIONS SHALL MATCH THE FLANGE. SEE INSERT PLATE DETAIL. INSERT PLATES SHALL BE TAGGED WITH THE PLANT ITEM NUMBER AND NOZZLE NUMBER AND SHIPPED WITH THE VESSEL.
8. WELD NUTS TO FLANGE.
9. SELLER TO DESIGN/ANALYZE THE AGITATOR NOZZLE N11 BASED ON THE FOLLOWING:

STATIC WEIGHT (lb.)	3,300
MAX TORQUE (in. lb.)	16,450
MAX ALLOWABLE TORQUE (in. lb.)	40,000
VERTICAL DOWN FORCE (lb.)	9,000
DYNAMIC TORQUE (in. lb.)	32,900
WEIGHT MOMENT (in. lb.)	11,250
BENDING MOMENT (in. lb.)	50,000
HP/SPEED/ROTATION	30/115/CW

10. SELLER TO DESIGN/ANALYZE THE ADS PUMP NOZZLES N07, N08, N09, N12, N13 AND N14 BASED ON THE FOLLOWING:

STATIC WEIGHT (lb.)	1,250
BENDING MOMENT (in. lb.)	12,000

11. SELLER TO DESIGN/ANALYZE THE VERTICAL PUMP NOZZLE N10 BASED ON THE FOLLOWING:

AXIAL DOWNWARD THRUST (lb.)	1,340
BENDING MOMENT (in. lb.)	210
MAX TORQUE (in. lb.)	1,260
PROJECTED WEIGHT (IN EMPTY VESSEL) INCLUDING MOTOR (lbs.)	3,337

12. SELLER TO ORIENT THE LIFTING HANDLE TO AVOID INTERFERENCE WITH OTHER NOZZLES.
13. DELETED
14. INSIDE DIAMETER OF NOZZLES N15 AND N16 MUST BE AT LEAST 9 3/4".

HOLDS:

1. NOZZLE LOCATIONS, SIZE AND "Z" DIMENSIONS PENDING CONFIRMATION ON AGITATOR AND VERTICAL PUMP SIZE.
2. LOCATION FOR NAMEPLATE & BRACKET, SKIRT VENTS AND SKIRT OPENINGS PENDING PIPING LOCATIONS BY PLANT DESIGN.
3. LOCATION FOR LIFTING LUGS & TAILING LUG PENDING REVIEW BY CONSTRUCTION.
4. DELETED
5. AGITATOR AND PUMP NOZZLES SIZE, DYNAMIC/STATIC LOADS, QTY, SIZE AND LOCATION OF BAFFLE PLATE PENDING CONFIRMATION FROM ROTATING EQUIPMENT GROUP.

PLEASE NOTE THAT SOURCE, SPECIAL NUCLEAR AND BYPRODUCT MATERIALS, AS DEFINED IN THE ATOMIC ENERGY ACT OF 1954 (AEA), ARE REGULATED AT THE U.S. DEPARTMENT OF ENERGY (DOE) FACILITIES EXCLUSIVELY BY DOE ACTING PURSUANT TO ITS AEA AUTHORITY. DOE ASSERTS, THAT PURSUANT TO THE AEA, IT HAS SOLE AND EXCLUSIVE RESPONSIBILITY AND AUTHORITY TO REGULATE SOURCE, SPECIAL NUCLEAR, AND BYPRODUCT MATERIALS AT DOE-OWNED NUCLEAR FACILITIES. INFORMATION CONTAINED HEREIN ON RADIONUCLIDES IS PROVIDED FOR PROCESS DESCRIPTION PURPOSES ONLY.

THIS DRAWING TO BE READ IN CONJUNCTION WITH MECHANICAL DATA SHEET 24590-LAW-MVD-LFP-P0007

QUALITY LEVEL DESIGNATION FOR ALL COMPONENTS OF THIS VESSEL IS CM.

REFERENCE DRAWINGS

DWG NO	REV	TITLE
24590-LAW-M6-LFP-P0001	0	P&ID
24590-WTP-MV-M59T-00001	1	PRESSURE VESSEL TOLERANCES STANDARD DETAILS
24590-WTP-MV-M59T-00007	2	THERMOWELL CONNECTION STANDARD DETAILS
24590-WTP-MV-M59T-00009	1	LIFTING LUGS STANDARD DETAILS
24590-WTP-MV-M59T-00010	1	TAILING LUG STANDARD DETAILS
24590-WTP-MV-M59T-00012	1	GROUNDING LUG STANDARD DETAILS
24590-WTP-MV-M59T-00016001	2	VESSEL CONNECTIONS STANDARD DETAILS SHT 1 OF 3
24590-WTP-MV-M59T-00016002	1	VESSEL CONNECTIONS STANDARD DETAILS SHT 2 OF 3
24590-WTP-MV-M59T-00016003	0	VESSEL CONNECTIONS STANDARD DETAILS SHT 3 OF 3
24590-WTP-MV-M59T-00017	1	VESSEL INSPECTION MANWAY STANDARD DETAILS
24590-WTP-MV-M59T-00026	1	ANCHOR BOLT CHAIR DETAILS FOR VERTICAL VESSELS
24590-WTP-MV-M59T-00018	1	VESSEL NAMEPLATE STANDARD DETAILS

REVISION HISTORY

REV	DESCRIPTION	ORG	CHKD	PWMD	APVD	DATE
0	ISSUED FOR PERMITTING USE					

CM
QUALITY LEVEL

PROJECT No.	24590
SITE	HANFORD
AREA	200E
BUILDING No.	20

RIVER PROTECTION PROJECT
WASTE TREATMENT PLANT
2435 STEVENS CENTER PLACE
RICHLAND, WA 99352

CONTRACT No. DE-AC27-01RV14136

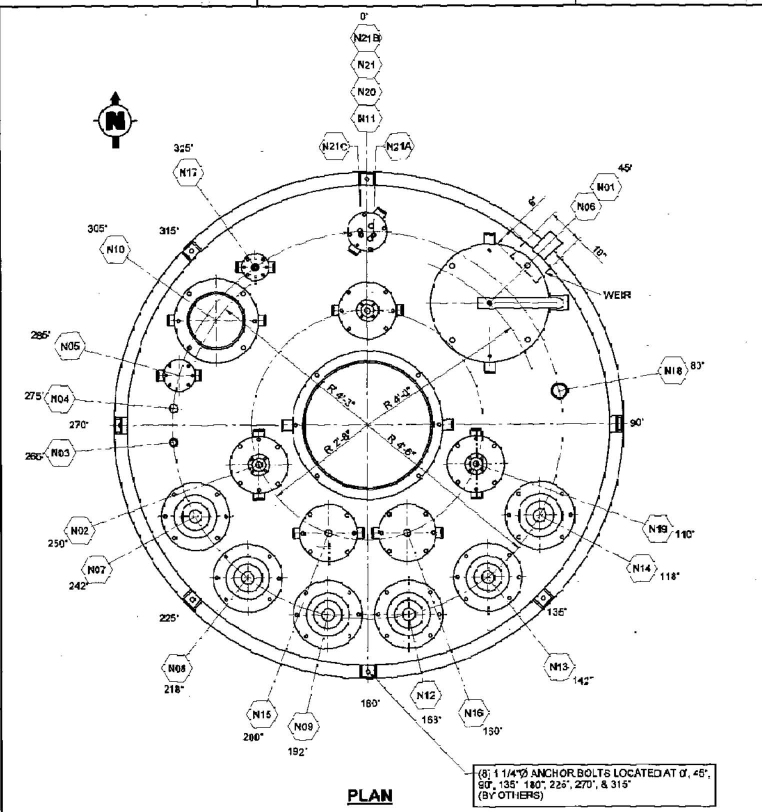
ORIGINATOR
CHECKER
APPROVER
REVIEWER

EQUIPMENT ASSEMBLY MELTER 1 FEED VESSEL LFP-VSL-00002

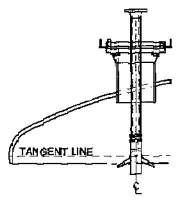
CONTENT APPLICABLE TO ALARA: ☐ YES ☐ NO
ADR No. REV

SCALE: NONE

24590-LAW-MV-LFP-P0001 REV 0

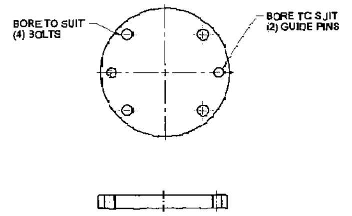


PLAN



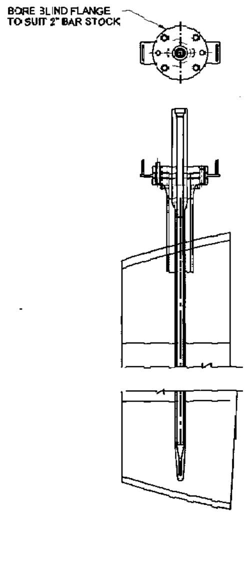
NOZZLE DETAIL

N02, N02A, N19, N19A, N20, N20A



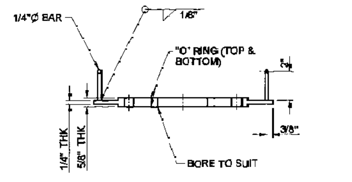
BLIND FLANGE

N05

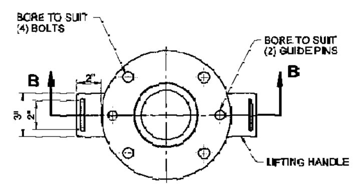


NOZZLE DETAIL

N17 & N17A

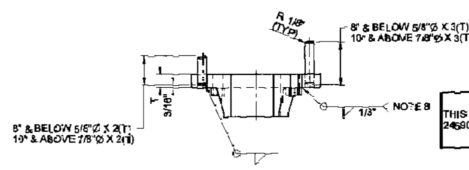


SECTION B-B

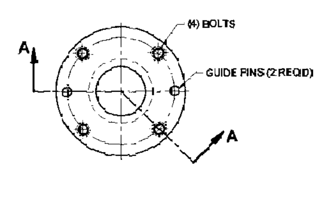


INSERT PLATE DETAIL

NOTE 7
N02, N05, N06, N10, N11, N15, N13, N17
N19, N20, N21

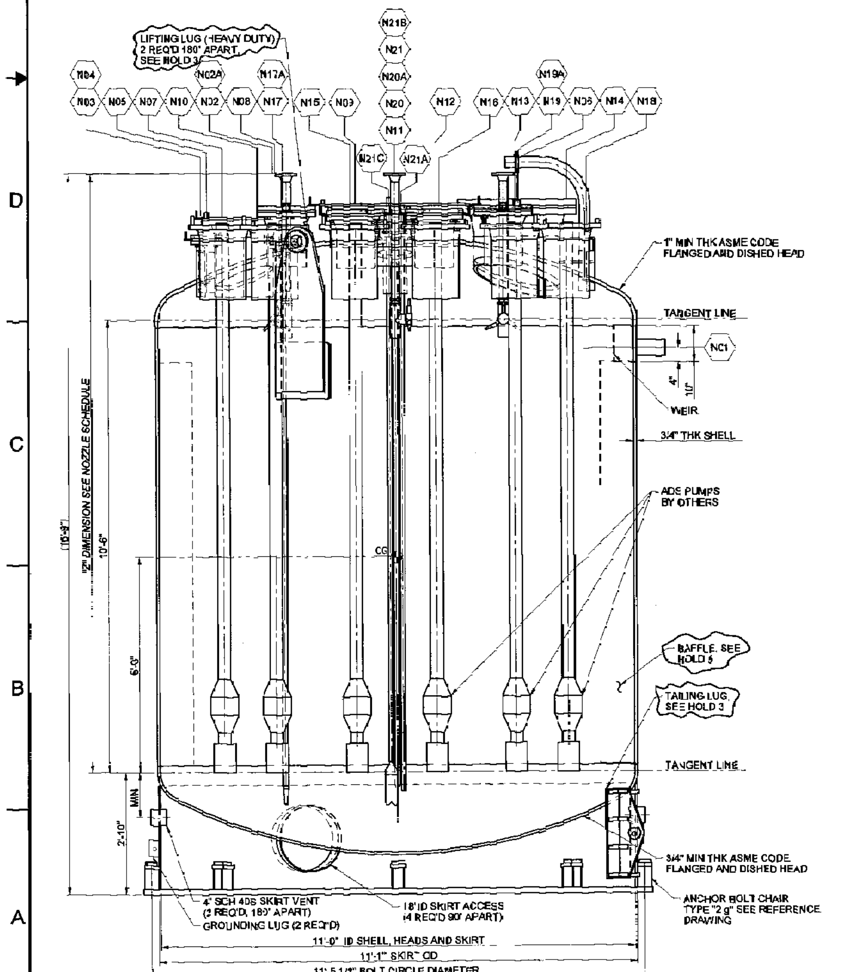


SECTION A-A



FLANGE DETAIL

NOTE 6
N02, N05, N06, N07, N08, N09, N10, N11, N12, N13, N14, N15, N16, N17, N19, N20, N21



ELEVATION

SEE PLAN VIEW FOR TRUE ORIENTATION

NOZZLE	SIZE	SCHED/WALL	SERVICE/REMARKS	"Z" DIM	REF DWG - DET	CONN. PIPE - SCHED
N01	4"	80S	OVERFLOW	9'-10"	24590-WTP-MV-M59T-00016001 DET 1	4" - 40S
N02	10"	80S	SPRAY NOZZLE LFP-NOZ-00008	13'-0"	24590-WTP-MV-M59T-00016001 DET 9	BLIND FLANGE
N02A	2"	160S	INLET TO SPRAY NOZZLE	13'-11"	24590-WTP-MV-M59T-00016001 DET 10	FLANGED
N03	2"	160S	INLET	-2'-4"	24590-WTP-MV-M59T-00016001 DET 2	2" - 80S
N04	2"	160S	INLET	-2'-4"	24590-WTP-MV-M59T-00016001 DET 2	2"-80S
N05	4"	160S	SPARE	-2'-4"	24590-WTP-MV-M59T-00016001 DET 9	BLIND FLANGE
N06	24"	PLATE	MANWAY	12'-11"	24590-WTP-MV-M59T-00017 DET 2	BLIND FLANGE W/DAVIT
N07	12"	8CS	SLURRY FROM LFP-PMP-00016	-2'-9"	24590-WTP-MV-M59T-00016001 DET 9	FLANGED, NOTE 10
N08	12"	8CS	SLURRY FROM LFP-PMP-00015	-2'-9"	24590-WTP-MV-M59T-00016001 DET 9	FLANGED, NOTE 10
N09	12"	8CS	SLURRY FROM LFP-PMP-00013	-2'-9"	24590-WTP-MV-M59T-00016001 DET 9	FLANGED, NOTE 10
N10	20" ID	4CS	PUMP LFP-PMP-00004	12'-10"	24590-WTP-MV-M59T-00016001 DET 9	FLANGED, NOTE 11
N11	36" ID	PLATE	AGITATOR LFP-AGT-00004	-3'-4"	24590-WTP-MV-M59T-00016001 DET 9	FLANGED, NOTE 9
N12	12"	8CS	SLURRY FROM LFP-PMP-00014	-2'-9"	24590-WTP-MV-M59T-00016001 DET 9	FLANGED, NOTE 10
N13	12"	8CS	SLURRY FROM LFP-PMP-00017	12'-9"	24590-WTP-MV-M59T-00016001 DET 9	FLANGED, NOTE 10
N14	12"	8CS	SLURRY FROM LFP-PMP-00018	12'-9"	24590-WTP-MV-M59T-00016001 DET 9	FLANGED, NOTE 10
N15	10"	4CS	INSTRUMENT (LEVEL/RADAR)	12'-11"	24590-WTP-MV-M59T-00016003 DET 25	FLANGED
N16	10"	4CS	INSTRUMENT (LEVEL/RADAR)	12'-11"	24590-WTP-MV-M59T-00016003 DET 25	FLANGED
N17	3"	8CS	THERMOWELL FLANGE	-2'-4"	24590-WTP-MV-M59T-00016001 DET 9	SEE DETAIL
N17A	1"	160S	THERMOWELL	13'-1"	24590-WTP-MV-M59T-00007 DET 7	3/4" NPT
N18	4"	80S	VENT	12'-4"	24590-WTP-MV-M59T-00016001 DET 8	4" - 40S
N19	10"	80S	SPRAY NOZZLE LFP-NOZ-00009	13'-0"	24590-WTP-MV-M59T-00016001 DET 9	BLIND FLANGE
N19A	2"	160S	INLET TO SPRAY NOZZLE	13'-11"	24590-WTP-MV-M59T-00016001 DET 10	FLANGED
N20	10"	80S	SPRAY NOZZLE LFP-NOZ-00010	13'-0"	24590-WTP-MV-M59T-00016001 DET 9	BLIND FLANGE
N20A	2"	160S	INLET TO SPRAY NOZZLE	13'-11"	24590-WTP-MV-M59T-00016001 DET 10	FLANGED
N21	6"	80S	INSTRUMENTATION	12'-6"	24590-WTP-MV-M59T-00016003 DET 27	BLIND FLANGE
N21A	1"	160S	BALANCE	13'-2"	24590-WTP-MV-M59T-00016003 DET 27	1" - 40S
N21B	1"	160S	DENSITY	13'-3"	24590-WTP-MV-M59T-00016003 DET 27	1" - 40S
N21C	1"	160S	LEVEL	13'-4"	24590-WTP-MV-M59T-00016003 DET 27	1" - 40S

GENERAL NOTES:

1. ALL FLANGE BOLT HOLES SHALL STRADDLE VESSEL NORMAL VESSEL CENTERLINE.
2. SELLER TO PROVIDE THE INTERNAL SPRAY NOZZLE (MODEL GAMAJET V II) FOR NOZZLE N02, N19 & N20. SPRAY NOZZLE PIPE TO BE WELDED ON THE BLIND FLANGE AND REMOVABLE.
3. ALL "Z" DIMENSIONS MEASURED FROM THE BOTTOM TANGENT LINE UNLESS OTHERWISE NOTED. FOR SHELL NOZZLE, "Z" DIMENSIONS MEASURED FROM CENTER LINE OF NOZZLE.
4. FOR DISTANCE OF DIP PIPES (LEGS) TO BOTTOM HEAD USE 2" CLEARANCE UNLESS OTHERWISE SPECIFIED.
5. SELLER TO PROVIDE NECESSARY SUPPORT/GUIDE SYSTEM FOR INTERNAL PARTS, PUMPS & AGITATOR NOZZLES.
6. USE STANDARD ASME 150# WNFF FLANGE & BLIND FLANGE DIMENSIONS WITH THE EXCEPTION OF ONLY 4 BOLTS AND 2 GUIDE PINS. SEE FLANGE DETAIL.
7. GASKET IS BY AN INSERT PLATE HAVING TWO CAPTIVE O-RINGS. INSERT PLATE DIMENSIONS SHALL MATCH THE FLANGE. SEE INSERT PLATE DETAIL. INSERT PLATES SHALL BE TAGGED WITH THE PLANT ITEM NUMBER AND NOZZLE NUMBER AND SHIPPED WITH THE VESSEL.
8. WELD NUTS TO FLANGE.
9. SELLER TO DESIGN/ANALYZE THE AGITATOR NOZZLE N11 BASED ON THE FOLLOWING:

STATIC WEIGHT (lb.)	3,300
MAX TORQUE (in. lb.)	16,450
MAX ALLOWABLE TORQUE (in. lb.)	40,000
VERTICAL DOWN FORCE (lb.)	9,000
DYNAMIC TORQUE (in. lb.)	32,900
WEIGHT MOMENT (in. lb.)	11,250
BENDING MOMENT (in. lb.)	50,000
HP/SPEED/ROTATION	30/115/CW

10. SELLER TO DESIGN/ANALYZE THE ADS PUMP NOZZLES N07, N08, N09, N12, N13 AND N14 BASED ON THE FOLLOWING:

STATIC WEIGHT (lb.)	1,250
BENDING MOMENT (in. lb.)	12,000

11. SELLER TO DESIGN/ANALYZE THE VERTICAL PUMP NOZZLE N10 BASED ON THE FOLLOWING

AXIAL DOWNWARD THRUST (lb.)	1,340
BENDING MOMENT (in. lb.)	210
MAX TORQUE (in. lb.)	1,250
PROJECTED WEIGHT (IN EMPTY VESSEL) INCLUDING MOTOR (lbs.)	3,337

12. SELLER TO ORIENT THE LIFTING HANDLE TO AVOID INTERFERENCE WITH OTHER NOZZLES.
13. DELETED
14. INSIDE DIAMETER OF NOZZLES N15 AND N16 MUST BE AT LEAST 9 3/4"

HOLDS:

1. NOZZLE LOCATIONS, SIZE AND "Z" DIMENSIONS PENDING CONFIRMATION ON AGITATOR AND VERTICAL PUMP SIZE.
2. LOCATION FOR NAMEPLATE & BRACKET, SKIRT VENTS AND SKIRT OPENINGS PENDING PIPING LOCATIONS BY PLANT DESIGN.
3. LOCATION FOR LIFTING LUGS & TAILING LUG PENDING REVIEW BY CONSTRUCTION.
4. DELETED
5. AGITATOR AND PUMP NOZZLES SIZE, DYNAMIC / STATIC LOADS, QTY, SIZE AND LOCATION OF BAFFLE PLATE PENDING CONFIRMATION FROM ROTATING EQUIPMENT GROUP.

PLEASE NOTE THAT SOURCE, SPECIAL NUCLEAR AND BYPRODUCT MATERIALS, AS DEFINED IN THE ATOMIC ENERGY ACT OF 1954 (AEA) ARE REGULATED AT THE U.S. DEPARTMENT OF ENERGY (DOE) FACILITIES EXCLUSIVELY BY DOE ACTING PURSUANT TO ITS AEA AUTHORITY. DOE ASSERTS, THAT PURSUANT TO THE AEA, IT HAS SOLE AND EXCLUSIVE RESPONSIBILITY AND AUTHORITY TO REGULATE SOURCE, SPECIAL NUCLEAR, AND BYPRODUCT MATERIALS AT DOE-OWNED NUCLEAR FACILITIES. INFORMATION CONTAINED HEREIN ON RADIONUCLIDES IS PROVIDED FOR PROCESS DESCRIPTION PURPOSES ONLY.

THIS DRAWING TO BE READ IN CONJUNCTION WITH MECHANICAL DATA SHEET 24590-LAW-MVD-LFP-P0008

QUALITY LEVEL DESIGNATION FOR ALL COMPONENTS OF THIS VESSEL IS CM.

REFERENCE DRAWINGS

DWG NO.	REV	TITLE
24590-LAW-M6-LFP-P0003	0	P&ID
24590-WTP-MV-M59T-00001	1	PRESSURE VESSEL TOLERANCES STANDARD DETAILS
24590-WTP-MV-M59T-00007	2	THERMOWELL CONNECTION STANDARD DETAILS
24590-WTP-MV-M59T-00009	1	LIFTING LUGS STANDARD DETAILS
24590-WTP-MV-M59T-00010	1	TAILING LUG STANDARD DETAILS
24590-WTP-MV-M59T-00012	1	GROUNDING LUG STANDARD DETAILS
24590-WTP-MV-M59T-00016001	2	VESSEL CONNECTIONS STANDARD DETAILS SHT 1 OF 3
24590-WTP-MV-M59T-00016002	1	VESSEL CONNECTIONS STANDARD DETAILS SHT 2 OF 3
24590-WTP-MV-M59T-00016003	0	VESSEL CONNECTIONS STANDARD DETAILS SHT 3 OF 3
24590-WTP-MV-M59T-00017	1	VESSEL INSPECTION MANWAY STANDARD DETAILS
24590-WTP-MV-M59T-00026	1	ANCHOR BOLT CHAIR DETAILS FOR VERTICAL VESSELS
24590-WTP-MV-M59T-00018	1	VESSEL NAME PLATE STANDARD DETAILS

REV	DESCRIPTION	ORG	CHKD	RVWD	APVD	DATE
0	ISSUED FOR PERMITTING USE					

REVISION HISTORY

CM
QUALITY LEVEL

PROJECT No. 24590 · SITE HANFORD · AREA 200E · BUILDING No. 20

RIVER PROTECTION PROJECT
WASTE TREATMENT PLANT
2435 STEVENS CENTER PLACE
RICHLAND, WA 99352

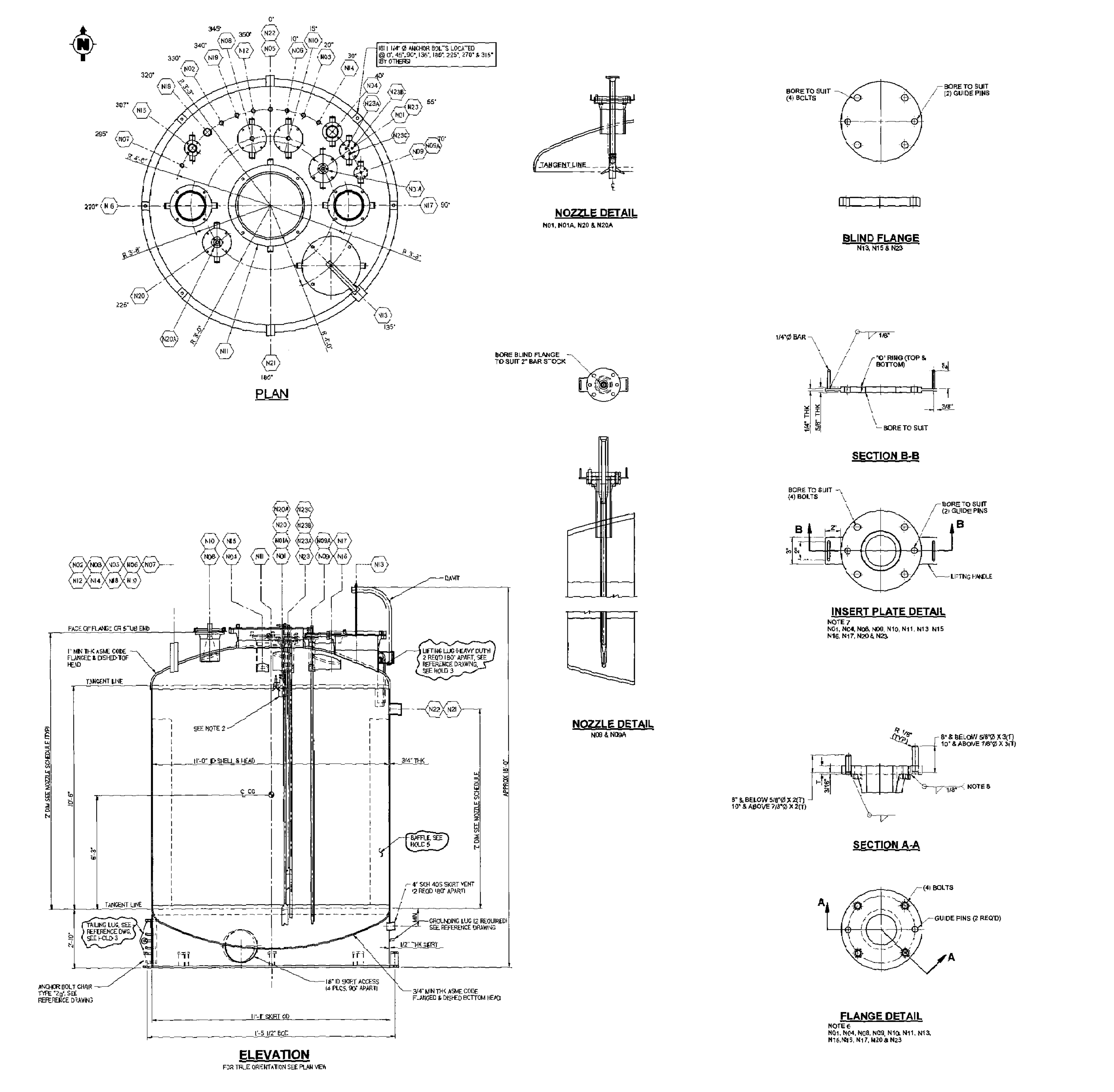
ORIGINATOR · CHECKER · APPROVER · REVIEWER

CONTENT APPLICABLE TO ALARA? YES NO

EQUIPMENT ASSEMBLY
MELTER 2 FEED VESSEL
LFP-VSL-00004

SCALE NONE

24590-LAW-MV-LFP-P0002 · REV 0



PLAN

NOZZLE DETAIL
N01, N01A, N20 & N20A

NOZZLE DETAIL
N09 & N09A

ELEVATION
FOR TRUE ORIENTATION SEE PLAN VIEW

BLIND FLANGE
N13, N15 & N23

SECTION B-B

INSERT PLATE DETAIL
NOTE 7
N01, N04, N08, N09, N10, N11, N13, N15, N16, N17, N20 & N23

SECTION A-A

FLANGE DETAIL
NOTE 6
N01, N04, N08, N09, N10, N11, N13, N16, N15, N17, N20 & N23

NOZZLE	SIZE	SCHED/WALL	SERVICE/REMARKS	"Z" DIM	REF DWG - DET	CONN PIPE - SCHED
N01	10"	80S	SPRAY NOZZLE LFP-NOZ-00001	12'-10"	24590-WTP-MV-M59T-00016001 DET 9	BLIND FLANGE
N01A	2"	160S	INLET TO SPRAY NOZZLE LFP-NOZ-0000	13'-4"	24590-WTP-MV-M59T-00016001 DET 10	FLANGED
N02	2"	160S	SPARE/CAPPED	12'-4"	24590-WTP-MV-M59T-00016001 DET 2	2" - 80S
N03	2"	160S	MELTER 2 FEED RETURN	12'-4"	24590-WTP-MV-M59T-00016001 DET 2	2" - 80S
N04	8"	80S	GLASS FORMER	12'-7"	24590-WTP-MV-M59T-00016001 DET 9	FLANGED
N05	2"	160S	MELTER FEED FROM CONC. VESSEL	12'-4"	24590-WTP-MV-M59T-00016001 DET 2	2" - 80S
N06	2"	160S	MELTER FEED FROM CONC. VESSEL	12'-4"	24590-WTP-MV-M59T-00016001 DET 2	2" - 80S
N07	2"	160S	SPARE/CAPPED	12'-4"	24590-WTP-MV-M59T-00016001 DET 2	2" - 80S
N08	10"	40S	INSTRUMENT (LEVEL/RADAR)	12'-10"	24590-WTP-MV-M59T-00016003 DET 25	FLANGED
N09	3"	80S	THERMOWELL FLANGE	13'-2"	24590-WTP-MV-M59T-00016001 DET 9	BLIND FLANGE
N09A	1"	160S	THERMOWELL	13'-10"	24590-WTP-MV-M59T-00007 DET 7	3/4" NPT
N10	10"	40S	INSTRUMENT (LEVEL/RADAR)	12'-10"	24590-WTP-MV-M59T-00016003 DET 25	FLANGED
N11	36" ID	PLATE	AGITATOR LFP-AGT-00001	13'-4"	24590-WTP-MV-M59T-00016001 DET 9	FLANGED (NOTE 9)
N12	2"	160S	RECIRCULATION	12'-4"	24590-WTP-MV-M59T-00016001 DET 2	2" - 80S
N13	24"	PLATE	MANWAY	13'-7"	24590-WTP-MV-M59T-00017 DET 2	BLIND FLANGE W/DAVIT
N14	2"	160S	SPARE	12'-4"	24590-WTP-MV-M59T-00016001 DET 2	CAPPED
N15	4"	80S	SPARE	12'-4"	24590-WTP-MV-M59T-00016001 DET 9	BLIND FLANGE
N16	20" ID	40S	PUMP LFP-PMP-00001A	12'-10"	24590-WTP-MV-M59T-00016001 DET 9	FLANGED (NOTE 10)
N17	20" ID	40S	PUMP LFP-PMP-00001B	12'-10"	24590-WTP-MV-M59T-00016001 DET 9	FLANGED (NOTE 10)
N18	4"	80S	VENT	13'-2"	24590-WTP-MV-M59T-00016001 DET 1	4" - 40S
N19	2"	160S	INLET	12'-4"	24590-WTP-MV-M59T-00016001 DET 2	2" - 80S
N20	10"	80S	SPRAY NOZZLE LFP-NOZ-00002	12'-10"	24590-WTP-MV-M59T-00016001 DET 9	BLIND FLANGE
N20A	2"	160S	INLET TO SPRAY NOZZLE LFP-NOZ-00002	13'-4"	24590-WTP-MV-M59T-00016001 DET 10	FLANGED
N21	4"	80S	OVERFLOW FROM FEED VESSEL	9'-10"	24590-WTP-MV-M59T-00016001 DET 2	4" - 40S
N22	4"	80S	OVERFLOW	9'-10"	24590-WTP-MV-M59T-00016001 DET 1	4" - 10S
N23	6"	80S	INSTRUMENTATION	13'-2"	24590-WTP-MV-M59T-00016003 DET 27	BLIND FLANGE
N23A	1"	160S	BALANCE	13'-3"	24590-WTP-MV-M59T-00016003 DET 27	1" - 40S
N23B	1"	160S	DENSITY	13'-9"	24590-WTP-MV-M59T-00016003 DET 27	1" - 40S
N23C	1"	160S	LEVEL	13'-10"	24590-WTP-MV-M59T-00016003 DET 27	1" - 40S

GENERAL NOTES:

1. ALL FLANGE BOLT HOLES SHALL STRADDLE VESSEL NORMAL VESSEL CENTERLINE.
2. SELLER TO PROVIDE THE INTERNAL SPRAY NOZZLE (MODEL GAMAJET VIII) FOR NOZZLE N01 & N20. SPRAY NOZZLE PIPE TO BE WELDED ON THE BLIND FLANGE AND REMOVABLE.
3. ALL "Z" DIMENSIONS MEASURED FROM THE BOTTOM TANGENT LINE UNLESS OTHERWISE NOTED. FOR SHELL NOZZLE, "Z" DIMENSIONS MEASURED FROM CENTER LINE OF NOZZLE.
4. FOR DISTANCE OF DIP PIPES (LEGS) TO BOTTOM HEAD USE 2" CLEARANCE UNLESS OTHERWISE SPECIFIED.
5. SELLER TO PROVIDE NECESSARY SUPPORT/GUIDE SYSTEM FOR INTERNAL PARTS, PUMPS & AGITATOR NOZZLES.
6. USE STANDARD ASME 150# WNFF FLANGE & BLIND FLANGE DIMENSIONS WITH THE EXCEPTION OF ONLY 4 BOLTS AND 2 GUIDE PINS. SEE FLANGE DETAIL.
7. GASKET IS BY AN INSERT PLATE HAVING TWO CAPTIVE O-RINGS. INSERT PLATE DIMENSIONS SHALL MATCH THE FLANGE. SEE INSERT PLATE DETAIL. INSERT PLATES SHALL BE TAGGED WITH THE PLANT ITEM NUMBER AND NOZZLE NUMBER AND SHIPPED WITH THE VESSEL.
8. WELD NUTS TO FLANGE.
9. SELLER TO DESIGN/ANALYZE THE AGITATOR NOZZLE N11 BASED ON THE FOLLOWING:

STATIC WEIGHT (lb.)	3,300
MAX TORQUE (in. lb.)	16,450
MAX ALLOWABLE TORQUE (in. lb.)	40,000
VERTICAL DOWN FORCE (lb.)	9,000
DYNAMIC TORQUE (in. lb.)	32,900
WEIGHT MOMENT (in. lb.)	11,250
BENDING MOMENT (in. lb.)	50,000
HP/SPEED/ROTATION	15/115/CW

10. SELLER TO DESIGN/ANALYZE VERTICAL PUMP NOZZLES N16 AND N17 BASED ON THE FOLLOWING:

AXIAL DOWNWARD THRUST (lb.)	1340
BENDING MOMENT (in. lb.)	210
MAX TORQUE (in. lb.)	1,260
PROJECTED WEIGHT (IN EMPTY VESSEL) INCLUDING MOTOR (lbs.)	3,337

11. SELLER TO ORIENT THE LIFTING HANDLE TO AVOID INTERFERENCE WITH OTHER NOZZLES.
12. REVISE NOZZLE TABLE BASED ON P & ID REVISION.
13. INSIDE DIAMETER OF NOZZLES N08 AND N10 MUST BE AT LEAST 9 3/4".

HOLDS:

1. NOZZLE LOCATIONS, SIZE AND "Z" DIMENSIONS PENDING CONFIRMATION ON AGITATOR AND VERTICAL PUMPS SIZE.
2. LOCATION FOR NAMEPLATE & BRACKET, SKIRT VENT AND SKIRT OPENING PENDING PIPING DESIGN BY PLANT DESIGN.
3. LOCATION FOR LIFTING LUGS AND TAILING LUG PENDING REVIEW BY CONSTRUCTION.
4. DELETED
5. AGITATOR AND PUMP NOZZLES SIZE, DYNAMIC / STATIC LOADS, QTY, SIZE AND LOCATION OF BAFFLE PLATE PENDING CONFIRMATION FROM ROTATING EQUIPMENT GROUP.

PLEASE NOTE THAT SOURCE, SPECIAL NUCLEAR AND BYPRODUCT MATERIALS, AS DEFINED IN THE ATOMIC ENERGY ACT OF 1954 (AEA), ARE REGULATED AT THE U.S. DEPARTMENT OF ENERGY (DOE) FACILITIES EXCLUSIVELY BY DOE ACTING PURSUANT TO ITS AEA AUTHORITY. DOE ASSERTS, THAT PURSUANT TO THE AEA, IT HAS SOLE AND EXCLUSIVE RESPONSIBILITY AND AUTHORITY TO REGULATE SOURCE, SPECIAL NUCLEAR, AND BYPRODUCT MATERIALS AT DOE-OWNED NUCLEAR FACILITIES. INFORMATION CONTAINED HEREIN ON RADIONUCLIDES IS PROVIDED FOR PROCESS DESCRIPTION PURPOSES ONLY.

THIS DRAWING TO BE READ IN CONJUNCTION WITH MECHANICAL DATA SHEETS 24590-LAW-MVD-LFP-P0010

QUALITY LEVEL DESIGNATION FOR ALL COMPONENTS OF THIS VESSEL IS CM.

REFERENCE DRAWINGS

DWG NO	REV	TITLE
24590-LAW-M6-LFP-P0001	0	P&ID
24590-WTP-MV-M59T-00001	1	PRESSURE VESSEL TOLERANCES STANDARD DETAILS
24590-WTP-MV-M59T-00007	1	THERMOWELL - CONNECTION STANDARD DETAILS
24590-WTP-MV-M59T-00009	1	LIFTING LUGS STANDARD DETAILS
24590-WTP-MV-M59T-00010	1	TAILING LUG STANDARD DETAILS
24590-WTP-MV-M59T-00012	1	GROUNDING LUG STANDARD DETAILS
24590-WTP-MV-M59T-00016001	2	VESSEL CONNECTIONS STANDARD DETAILS SHT 1 OF 3
24590-WTP-MV-M59T-00016002	1	VESSEL CONNECTIONS STANDARD DETAILS SHT 2 OF 3
24590-WTP-MV-M59T-00016003	0	VESSEL CONNECTIONS STANDARD DETAILS SHT 3 OF 3
24590-WTP-MV-M59T-00017	1	VESSEL INSPECTION MANWAY STANDARD DETAILS
24590-WTP-MV-M59T-00018	1	VESSEL NAME PLATE STANDARD DETAILS
24590-WTP-MV-M59T-00026	1	ANCHOR BOLT CHAIR DETAILS FOR VERTICAL VESSELS

REVISION HISTORY

REV	DESCRIPTION	ORG	CHKD	RVWD	APVD	DATE
0	ISSUED FOR PERMITTING USE					12/23/03

CM
QUALITY LEVEL

PROJECT No.	24590
SITE	HANFORD
AREA	200E
BUILDING No.	20

RIVER PROTECTION PROJECT
WASTE TREATMENT PLANT
2435 STEVENS CENTER PLACE
RICHLAND, WA 99352

CONTRACT No: DE-AC27-01RV14136

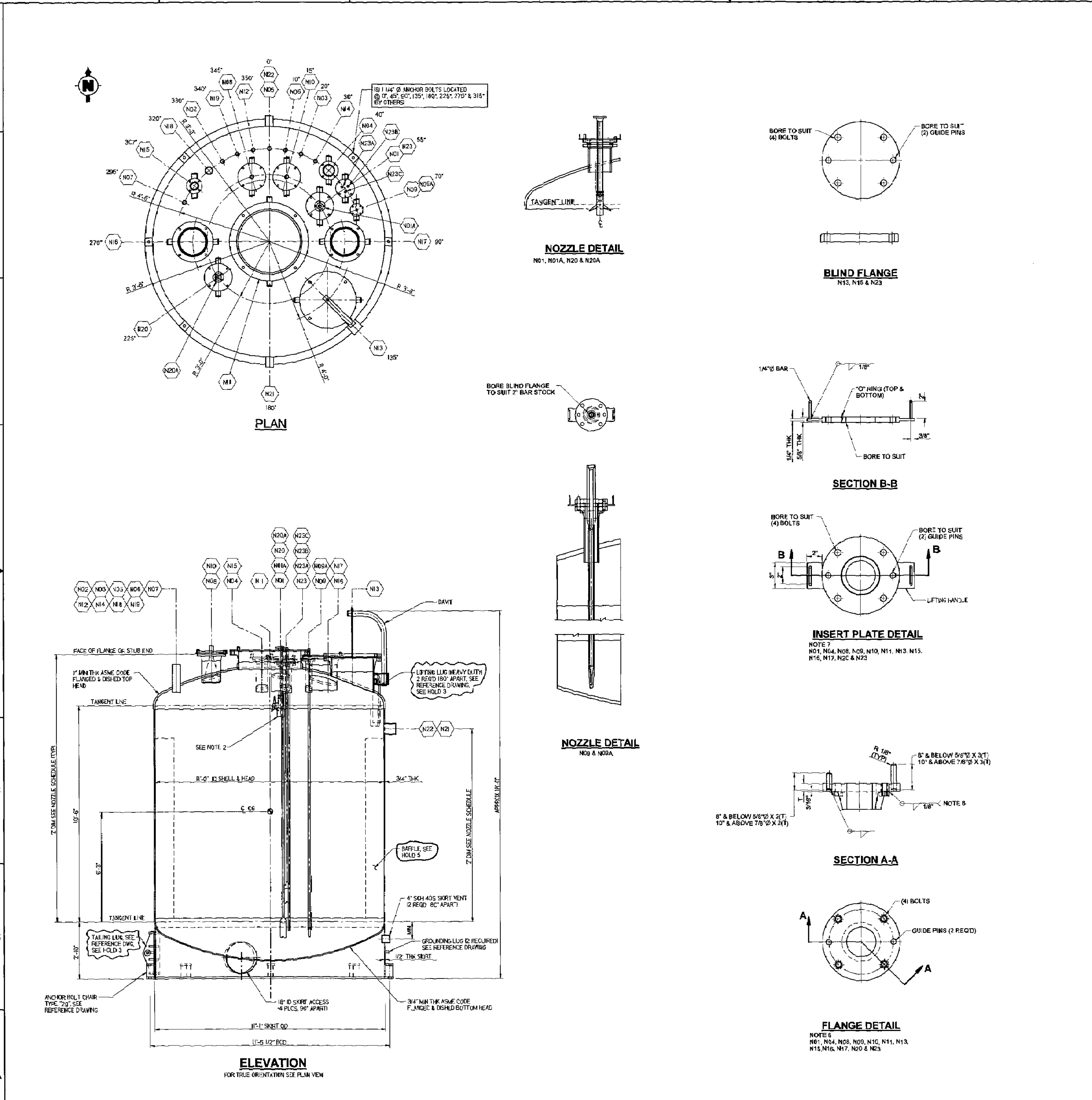
	BY	DATE
ORIGINATOR		11-13-03
CHECKER		11/13/03
APPROVER		12/23/03
REVIEWER		11/14/03

CONTENT APPLICABLE TO ALARA? YES NO

EQUIPMENT ASSEMBLY
MELTER 1 FEED PREPARATION VESSEL
LFP-VSL-00001

SCALE: NONE | 24590-LAW-MV-LFP-P0004 | REV 0

'E' SIZE - 44x34
COMPUTER GENERATED BY SOLE EDGE. MANUAL CHANGES NOT PERMITTED.
WHEN REFERENCING DRAWING AVOID MIN NUMBERS IN DOCUMENTS, BE SURE TO INCLUDE DASHES BETWEEN ELEMENTS



NOZZLE	SIZE	SCHED/WALL	SERVICE/REMARKS	"Z" DIM	REF DWG - DET	CONN PIPE - SCHED
N01	10"	30S	SPRAY NOZZLE LFP-NOZ-00006	12'-10"	24590-WTP-MV-M59T-00016001 DET 9	BLIND FLANGE
N01A	2"	160S	INLET TO SPRAY NOZZLE LFP-NOZ-00006	13'-4"	24590-WTP-MV-M59T-00016001 DET 10	FLANGED
N02	2"	160S	MELTER 1 FEED RETURN	12'-4"	24590-WTP-MV-M59T-00016001 DET 2	2" - 80S
N03	2"	160S	SPARE/CAPPED	12'-4"	24590-WTP-MV-M59T-00016001 DET 2	2" - 80S
N04	8"	30S	GLASS FORMER	12'-7"	24590-WTP-MV-M59T-00016001 DET 9	FLANGED
N05	2"	160S	MELTER FEED FROM CONC. VESSEL	12'-4"	24590-WTP-MV-M59T-00016001 DET 2	2" - 80S
N06	2"	160S	MELTER FEED FROM CONC. VESSEL	12'-4"	24590-WTP-MV-M59T-00016001 DET 2	2" - 80S
N07	2"	160S	SPARE/CAPPED	12'-4"	24590-WTP-MV-M59T-00016001 DET 2	2" - 80S
N08	10"	40S	INSTRUMENT (LEVEL/RADAR)	12'-10"	24590-WTP-MV-M59T-00016003 DET 25	FLANGED
N09	3"	30S	THERMOWELL FLANGE	13'-2"	24590-WTP-MV-M59T-00016001 DET 9	BLIND FLANGE
N09A	1"	160S	THERMOWELL	13'-10"	24590-WTP-MV-M59T-00007 DET 7	3/4" NPT
N10	10"	40S	INSTRUMENT (LEVEL/RADAR)	12'-10"	24590-WTP-MV-M59T-00016003 DET 25	FLANGED
N11	36" ID	PLATE	AGITATOR LFP-AGT-00003	13'-4"	24590-WTP-MV-M59T-00016001 DET 9	FLANGED (NOTE 9)
N12	2"	160S	RECIRCULATION	12'-4"	24590-WTP-MV-M59T-00016001 DET 2	2" - 80S
N13	24"	PLATE	MANWAY	13'-7"	24590-WTP-MV-M59T-00017 DET 2	BLIND FLANGE W/DAVIT
N14	2"	160S	SPARE	12'-4"	24590-WTP-MV-M59T-00016001 DET 2	CAPPED
N15	4"	30S	SPARE	12'-4"	24590-WTP-MV-M59T-00016001 DET 9	BLIND FLANGE
N16	20" ID	40S	PUMP LFP-PMP-00003A	12'-10"	24590-WTP-MV-M59T-00016001 DET 9	FLANGED (NOTE 10)
N17	20" ID	40S	PUMP LFP-PMP-00003B	12'-10"	24590-WTP-MV-M59T-00016001 DET 9	FLANGED (NOTE 10)
N18	4"	30S	VENT	13'-2"	24590-WTP-MV-M59T-00016001 DET 1	4" - 40S
N19	2"	160S	INLET	12'-4"	24590-WTP-MV-M59T-00016001 DET 2	2" - 80S
N20	10"	30S	SPRAY NOZZLE LFP-NOZ-00007	12'-10"	24590-WTP-MV-M59T-00016001 DET 9	BLIND FLANGE
N20A	2"	160S	INLET TO SPRAY NOZZLE LFP-NOZ-00007	13'-4"	24590-WTP-MV-M59T-00016001 DET 10	FLANGED
N21	4"	30S	OVERFLOW FROM FEED VESSEL	9'-10"	24590-WTP-MV-M59T-00016001 DET 2	4" - 40S
N22	4"	30S	OVERFLOW	9'-10"	24590-WTP-MV-M59T-00016001 DET 1	4" - 10S
N23	6"	30S	INSTRUMENTATION	13'-2"	24590-WTP-MV-M59T-00016003 DET 27	BLIND FLANGE
N23A	1"	160S	BALANCE	13'-8"	24590-WTP-MV-M59T-00016003 DET 27	1" - 40S
N23B	1"	160S	DENSITY	13'-9"	24590-WTP-MV-M59T-00016003 DET 27	1" - 40S
N23C	1"	160S	LEVEL	13'-10"	24590-WTP-MV-M59T-00016003 DET 27	1" - 40S

GENERAL NOTES:

1. ALL FLANGE BOLT HOLES SHALL STRADDLE VESSEL NORMAL VESSEL CENTERLINE.
2. SELLER TO PROVIDE THE INTERNAL SPRAY NOZZLE (MODEL GAMAJET VIII) FOR NOZZLE N01 & N20. SPRAY NOZZLE PIPE TO BE WELDED ON THE BLIND FLANGE AND REMOVABLE.
3. ALL "Z" DIMENSIONS MEASURED FROM THE BOTTOM TANGENT LINE UNLESS OTHERWISE NOTED. FOR SHELL NOZZLE, "Z" DIMENSIONS MEASURED FROM CENTER LINE OF NOZZLE.
4. FOR DISTANCE OF DIP PIPES (LEGS) TO BOTTOM HEAD USE 2" CLEARANCE UNLESS OTHERWISE SPECIFIED.
5. SELLER TO PROVIDE NECESSARY SUPPORT/GUIDE SYSTEM FOR INTERNAL PARTS, PUMPS & AGITATOR NOZZLES.
6. USE STANDARD ASME 150# WNFF FLANGE & BLIND FLANGE DIMENSIONS WITH THE EXCEPTION OF ONLY 4 BOLTS AND 2 GUIDE PINS. SEE FLANGE DETAIL.
7. GASKET IS BY AN INSERT PLATE HAVING TWO CAPTIVE O-RINGS. INSERT PLATE DIMENSIONS SHALL MATCH THE FLANGE. SEE INSERT PLATE DETAIL. INSERT PLATES SHALL BE TAGGED WITH THE PLANT ITEM NUMBER AND NOZZLE NUMBER AND SHIPPED WITH THE VESSEL.
8. WELD NUTS TO FLANGE
9. SELLER TO DESIGN/ANALYZE THE AGITATOR NOZZLE N11 BASED ON THE FOLLOWING:

STATIC WEIGHT (lb.)	3,300
MAX TORQUE (in. lb.)	19,450
MAX ALLOWABLE TORQUE (in. lb.)	40,000
VERTICAL DOWN FORCE (lb.)	9,000
DYNAMIC TORQUE (in. lb.)	32,900
WEIGHT MOMENT (in. lb.)	11,250
BENDING MOMENT (in. lb.)	50,000
HP/SPEED/ROTATION	15/115/CW

10. SELLER TO DESIGN/ANALYZE PUMP NOZZLES N16 AND N17 BASED ON THE FOLLOWING:

AXIAL DOWNWARD THRUST (lb.)	1340
BENDING MOMENT (in. lb.)	210
MAX TORQUE (in. lb.)	1260
PROJECTED WEIGHT (IN EMPTY VESSEL) INCLUDING MOTOR (lbs.)	3,337

11. SELLER TO ORIENT THE LIFTING HANDLE TO AVOID INTERFERENCE WITH OTHER NOZZLES.
12. REVISE NOZZLE TABLE BASED ON P & ID REVISION.
13. INSIDE DIAMETER OF NOZZLES N08 AND N10 MUST BE AT LEAST 9 3/4".

HOLDS:

1. NOZZLE LOCATIONS, SIZE AND "Z" DIMENSIONS PENDING CONFIRMATION ON AGITATOR AND VERTICAL PUMPS SIZE.
2. LOCATION FOR NAMEPLATE & BRACKET, SKIRT VENT AND SKIRT OPENING PENDING PIPING DESIGN BY PLANT DESIGN.
3. LOCATION FOR LIFTING LUGS AND TAILING LUG PENDING REVIEW BY CONSTRUCTION.
4. DELETED
5. AGITATOR AND PUMP NOZZLES SIZE, DYNAMIC / STATIC LOADS, QTY, SIZE AND LOCATION OF BAFFLE PLATE PENDING CONFIRMATION FROM ROTATING EQUIPMENT GROUP.

PLEASE NOTE THAT SOURCE, SPECIAL NUCLEAR AND BYPRODUCT MATERIALS, AS DEFINED IN THE ATOMIC ENERGY ACT OF 1954 (AEA) ARE REGULATED AT THE U.S. DEPARTMENT OF ENERGY (DOE) FACILITIES EXCLUSIVELY BY DOE ACTING PURSUANT TO ITS AEA AUTHORITY. DOE ASSERTS, THAT PURSUANT TO THE AEA, IT HAS SOLE AND EXCLUSIVE RESPONSIBILITY AND AUTHORITY TO REGULATE SOURCE, SPECIAL NUCLEAR, AND BYPRODUCT MATERIALS AT DOE-OWNED NUCLEAR FACILITIES. INFORMATION CONTAINED HEREIN ON RADIONUCLIDES IS PROVIDED FOR PROCESS DESCRIPTION PURPOSES ONLY.

QUALITY LEVEL DESIGNATION FOR ALL COMPONENTS OF THIS VESSEL IS CM.

THIS DRAWING TO BE READ IN CONJUNCTION WITH MECHANICAL DATA SHEETS 24590-LAW-MVD-LFP-P0011

REFERENCE DRAWINGS

DWG NO	REV	TITLE
24590-LAW-M6-LFP-P0003	0	P&ID
24590-WTP-MV-M59T-C0001	1	PRESSURE VESSEL TOLERANCES STANDARD DETAILS
24590-WTP-MV-M59T-C0007	1	THERMOWELL CONNECTION STANDARD DETAILS
24590-WTP-MV-M59T-C0009	1	LIFTING LUGS STANDARD DETAILS
24590-WTP-MV-M59T-C0010	1	TAILING LUG STANDARD DETAILS
24590-WTP-MV-M59T-C0012	1	GROUNDING LUG STANDARD DETAILS
24590-WTP-MV-M59T-C0016001	2	VESSEL CONNECTIONS STANDARD DETAILS SHT 1 OF 3
24590-WTP-MV-M59T-C0016002	1	VESSEL CONNECTIONS STANDARD DETAILS SHT 2 OF 3
24590-WTP-MV-M59T-C0016003	0	VESSEL CONNECTIONS STANDARD DETAILS SHT 3 OF 3
24590-WTP-MV-M59T-C0017	1	VESSEL INSPECTION MANWAY STANDARD DETAILS
24590-WTP-MV-M59T-C0018	1	VESSEL NAME PLATE STANDARD DETAILS
24590-WTP-MV-M59T-C0026	1	ANCHOR BOLT CHAIR DETAILS FOR VERTICAL VESSELS

REVISION HISTORY

REV	DESCRIPTION	ORG	CHKD	RVWD	APVD	DATE
0	ISSUED FOR PERMITTING USE					12/04/03

CM
QUALITY LEVEL

PROJECT No.	24590
SITE	HANFORD
AREA	200E
BLDG NO.	20

RIVER PROTECTION PROJECT
WASTE TREATMENT PLANT
2435 STEVENS CENTER PLACE
RICHLAND, WA 99352

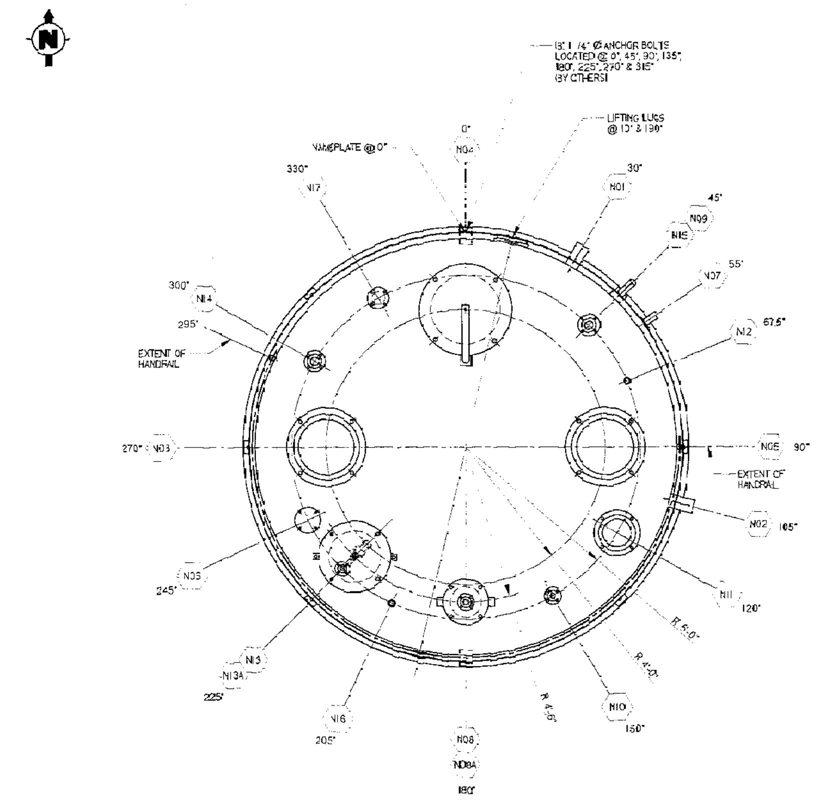
CONTRACT No: DE-AC27-01RV14136

	BY	DATE
ORIGINATOR		11-13-03
CHECKER		11/13/03
APPROVER		12/04/03
REVIEWER		11/14/03

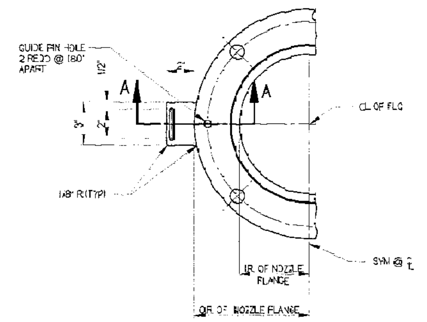
CONTENT APPLICABLE TO ALARA? ☐ YES ☐ NO
ADR NO. REV:
DN REFERENCE No:

EQUIPMENT ASSEMBLY
MELTER 2 FEED PREPARATION VESSEL
LFP-VSL-00003

SCALE NONE | 24590-LAW-MV-LFP-P0005 | REV 0



PLAN



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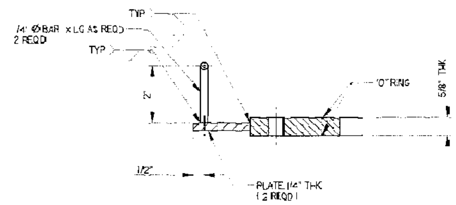
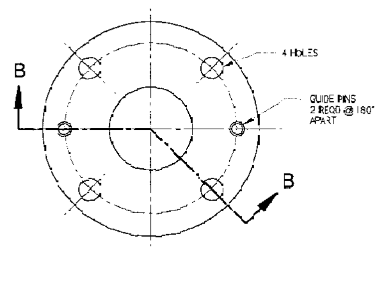
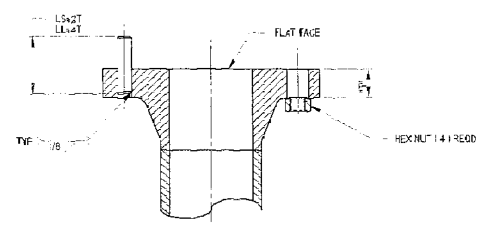


SECTION A-A

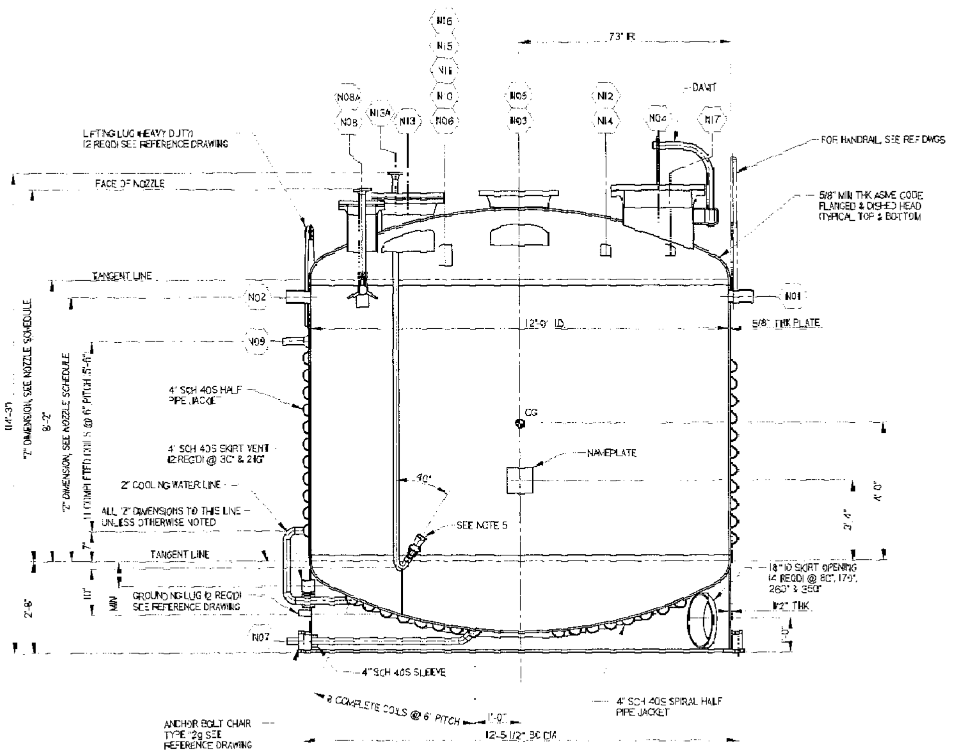
FOR ALL NOZZLES WITH FLANGE CONNECTION



FLANGE DETAIL



SECTION B-B



ELEVATION

FOR TRUE ORIENTATION, SEE PLAN VIEW

NOZZLE	SIZE	SCHED/WALL	SERVICE/REMARKS	"Z" DIM	REF DWG/DET	CONN PIPE SIZE/SCHED
N01	4"	80S	INLET (OVERFLOW SBS COLUMN)	7'-8"	24590-WTP-VV-V59T-00016001 DET 1	4"-40S
N02	4"	80S	INLET (OVERFLOW SBS COLUMN)	7'-8"	24590-WTP-VV-V59T-00016001 DET 1	4"-40S
N03	20" ID	PLATE	PUMP CONNECTION	10'-5"	24590-WTP-VV-V59T-00016001 DET 9	FLANGED
N04	24"	PLATE	MANWAY	10'-5"	24590-WTP-MV-M59T-00017 DET 2	BLIND FLANGE W/DAVIT
N05	20" ID	PLATE	PUMP CONNECTION	10'-3"	24590-WTP-VV-M59T-00016001 DET 9	FLANGED
N06	4"	80S	SPARE	10'-3"	24590-WTP-VV-V59T-00016001 DET 9	BLIND FLANGE
N07	2"	80S	CHILLED WATER SUPPLY	2'-4"	24590-WTP-VV-V59T-00016001 DET 1	2"-40S
N08	10"	80S	INLET TO WASH NOZZLE	10'-5"	24590-WTP-VV-V59T-00016001 DET 9	BLIND FLANGE
N08A	2"	160S	INLET TO WASH NOZZLE	11'-1"	24590-WTP-VV-V59T-00016001 DET 9	FLANGED
N09	2"	80S	CHILLED WATER RETURN	5'-11/16"	24590-WTP-VV-V59T-00016001 DET 1	2"-40S
N10	2"	160S	SPARE	10'-3"	24590-WTP-VV-V59T-00016001 DET 9	FLANGED
N11	10"	NOTE 8	LEVEL INSTRUMENT (RADAR)	10'-3"	24590-WTP-MV-M59T-00016003 DET 25	FLANGED
N12	2"	160S	VENT	10'-3"	24590-WTP-VV-M59T-00016001 DET 1	2"-40S
N13	18"	PLATE	EDUCTOR	10'-5"	24590-WTP-VV-V59T-00016001 DET 9	BLIND FLANGE
N13A	1 1/2"	160S	EDUCTOR	11'-1"	24590-WTP-VV-V59T-00016001 DET 2	FLANGED
N14	3"	80S	INSTRUMENT (SPARE)	10'-3"	24590-WTP-VV-V59T-00016001 DET 9	BLIND FLANGE
N15	3"	80S	TEMPERATURE (SPARE)	10'-3"	24590-WTP-VV-V59T-00016001 DET 9	BLIND FLANGE
N16	2"	160S	SPARE	10'-3"	24590-WTP-VV-V59T-00016001 DET 1	CAPPED
N17	3"	160S	SPARE	10'-3"	24590-WTP-VV-V59T-00016001 DET 9	BLIND FLANGE

GENERAL NOTES:

1. ALL BOLT HOLES SHALL STRADDLE VESSEL NATURAL CENTERLINE.
2. SELLER TO PROVIDE THE INTERNAL SPRAYJET NOZZLE (MODEL GAMAJET VIII) FOR NOZZLE N08. SPRAY NOZZLE PIPE TO BE WELDED ON THE BLIND FLANGE AND BE REMOVEABLE.
3. "Z" DIMENSION FOR SHELL NOZZLE MEASURED FROM CENTER LINE OF NOZZLE FACE.
4. SELLER TO PROVIDE NECESSARY SUPPORT/GUIDE FOR INTERNAL PARTS.
5. SELLER TO PROVIDE ONE EDUCTOR PENBERTHY MODEL ETE 1" SCREWED CONNECTION.
6. ALL FLANGES SHALL BE ANSI FFWN AS A MINIMUM WITH ONLY 4 BOLTS AND 2 GUIDE PINS. SELLER TO WELD NUTS ON UNDERSIDE OF FLANGE AT EACH BOLT HOLE AND TO PROVIDE TWO (2) 1/2" DIAMETER GUIDE PINS (ONE LONG (LL) AND ONE SHORT (LS) ON THE FLANGE.
7. SELLER TO PROVIDE THE FINITE ELEMENT ANALYSIS (FEA) FOR THE DYNAMIC/STATIC PUMP LOADS WHICH WILL BE FURNISHED BY BUYER LATER.
8. INSIDE DIAMETER OF NOZZLE N11 MUST BE 9 3/4" NB.
9. DELETED

VESSEL COMPONENT QUALITY LEVELS	
COMPONENT	QUALITY LEVEL
SBS CONDENSATE VESSEL, SKIRT, ALL NOZZLES	QL-1
ALL INTERNAL SUPPORTS, PIPING	QL-1
HALF PIPE JACKET	QL-1
SPRAY JET NOZZLE, EDUCTOR	CM

THIS DRAWING TO BE READ IN CONJUNCTION WITH THE MECHANICAL DATA SHEET NO 24590-LAW-MVD-LOP-P0004

PLEASE NOTE THAT SOURCE, SPECIAL NUCLEAR AND BYPRODUCT MATERIALS, AS DEFINED IN THE ATOMIC ENERGY ACT OF 1954 (AEA), ARE REGULATED AT THE U.S. DEPARTMENT OF ENERGY (DOE) FACILITIES EXCLUSIVELY BY DOE ACTING PURSUANT TO ITS AEA AUTHORITY. DOE ASSERTS, THAT PURSUANT TO THE AEA, IT HAS SOLE AND EXCLUSIVE RESPONSIBILITY AND AUTHORITY TO REGULATE SOURCE, SPECIAL NUCLEAR AND BYPRODUCT MATERIALS AT DOE-OWNED NUCLEAR FACILITIES. INFORMATION CONTAINED HEREIN ON RADIONUCLIDES IS PROVIDED FOR PROCESS DESCRIPTION PURPOSES ONLY.

REFERENCE DRAWINGS		
DWG NO	REV	TITLE
24590-LAW-M6-LOP-P0001	C	P & ID
24590-WTP-MV-M59T-00001	2	PRESSURE VESSEL TOLERANCES STANDARD DETAILS
24590-WTP-MV-M59T-00009	1	LIFTING LUGS STANDARD DETAILS
24590-WTP-MV-M59T-00010	1	TAILING LUG STANDARD DETAILS
24590-WTP-MV-M59T-00007	2	THERMOWELL CONNECTION STANDARD DETAILS
24590-WTP-MV-M59T-00016001	2	VESSEL CONNECTIONS STANDARD DETAILS SHT 1 OF 3
24590-WTP-MV-M59T-00016003	C	VESSEL CONNECTIONS STANDARD DETAILS SHT 3 OF 3
24590-WTP-MV-M59T-00017	1	VESSEL INSPECTION MANWAY STANDARD DETAILS
24590-WTP-MV-M59T-00018	1	VESSEL NAME PLATE STANDARD DETAILS
24590-WTP-MV-M59T-00012	1	GROUNDING LUG
24590-WTP-MV-M59T-00026	1	ANCHOR BOLT CHAIR DETAIL FOR VERTICAL VESSELS
24590-WTP-SS-S15T-00035	C	CIVIL/STRUCTURAL STANDARDS STRUCTURAL STEEL DETAILS OSHA PIPE HANDRAILS
24590-WTP-SS-S15T-00038	4	CIVIL/STRUCTURAL STANDARDS STRUCTURAL STEEL DETAILS PIPE HANDRAILS

Q

REV	DESCRIPTION	ORG	CHKD	RVWD	APVD	DATE
0	ISSUED FOR PERMITTING USE					

REVISION HISTORY

PROJECT No.	24590
SITE	HANFORD
AREA	200E
BUILDING No.	30

	BY	DATE
ORIGINATOR		
CHECKER		
APPROVER		
REVIEWER		

CONTENT APPLICABLE TO ALARA? ☐ YES ☐ NO
ADR NO. REV:

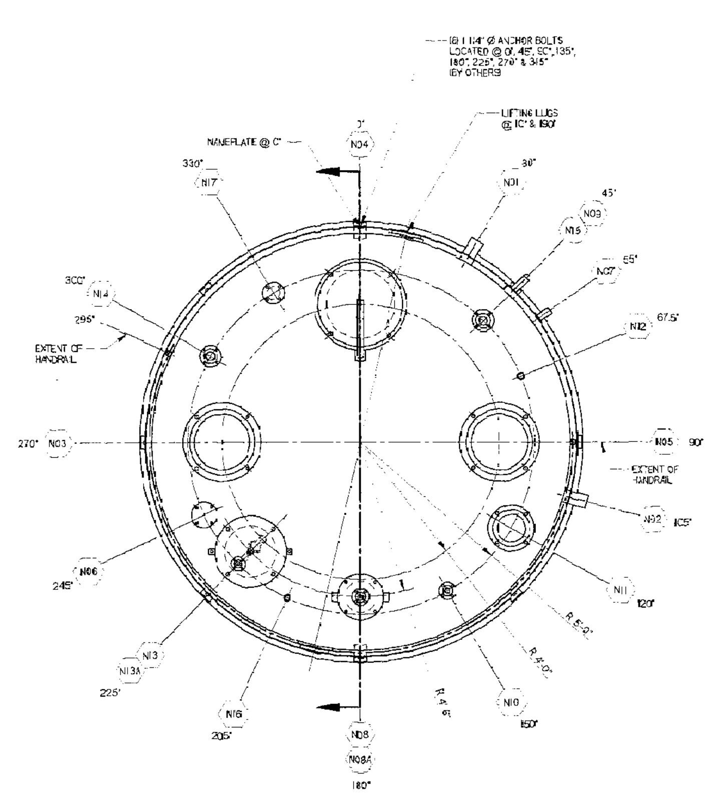
RIVER PROTECTION PROJECT
WASTE TREATMENT PLANT
2435 STEVENS CENTER PLACE
RICHLAND, WA 99352

CONTRACT No: DE-AC27-01RV14136

EQUIPMENT ASSEMBLY
LAW MELTER 1 SBS CONDENSATE VESSEL
LCP-VSL-00001

SCALE: NONE | 24590-LAW-MV-LOP-P0001 | REV 0

NOZZLE	SIZE	SCHED/WALL	SERVICE/REMARKS	"Z" DIM	REF DWG/DET	CONN PIPE SIZE/SCHED
N01	4"	80S	INLET (OVERFLOW SBS COLUMN)	7'-8"	24590-WTP-MV-M59T-00016001 DET 1	4"-40S
N02	4"	80S	INLET (OVERFLOW SBS COLUMN)	7'-8"	24590-WTP-MV-M59T-00016001 DET 1	4"-40S
N03	20" ID	PLATE	PUMP CONNECTION	10'-5"	24590-WTP-MV-M59T-00016001 DET 9	FLANGED
N04	24"	PLATE	MANWAY	10'-5"	24590-WTP-MV-M59T-00017 DET 2	BLIND FLANGE W/DAVIT
N05	20" ID	PLATE	PUMP CONNECTION	10'-3"	24590-WTP-MV-M59T-00016001 DET 9	FLANGED
N06	4"	80S	SPARE	10'-3"	24590-WTP-MV-M59T-00016001 DET 9	BLIND FLANGE
N07	2"	80S	CHILLED WATER SUPPLY	2'-4"	24590-WTP-MV-M59T-00016001 DET 1	2"-40S
N08	10"	80S	INLET TO WASH NOZZLE	10'-6"	24590-WTP-MV-M59T-00016001 DET 9	BLIND FLANGE
N08A	2"	160S	INLET TO WASH NOZZLE	11'-1"	24590-WTP-MV-M59T-00016001 DET 9	FLANGED
N09	2"	80S	CHILLED WATER RETURN	6-11/16"	24590-WTP-MV-M59T-00016001 DET 1	2"-40S
N10	2"	160S	SPARE	10'-3"	24590-WTP-MV-M59T-00016001 DET 9	FLANGED
N11	10"	NOTE 8	LEVEL INSTRUMENT (RADAR)	10'-3"	24590-WTP-MV-M59T-00016003 DET 25	FLANGED
N12	2"	160S	VENT	10'-3"	24590-WTP-MV-M59T-00016001 DET 1	2"-40S
N13	18"	PLATE	EDUCTOR	10'-5"	24590-WTP-MV-M59T-00016001 DET 9	BLIND FLANGE
N13A	1 1/2"	160S	EDUCTOR	11'-1"	24590-WTP-MV-M59T-00016001 DET 2	FLANGED
N14	3"	80S	INSTRUMENT (SPARE)	10'-3"	24590-WTP-MV-M59T-00016001 DET 9	BLIND FLANGE
N15	3"	80S	TEMPERATURE (SPARE)	10'-3"	24590-WTP-MV-M59T-00016001 DET 9	BLIND FLANGE
N16	2"	160S	SPARE	10'-3"	24590-WTP-MV-M59T-00016001 DET 1	CAPPED
N17	3"	160S	SPARE	10'-3"	24590-WTP-MV-M59T-00016001 DET 9	BLIND FLANGE



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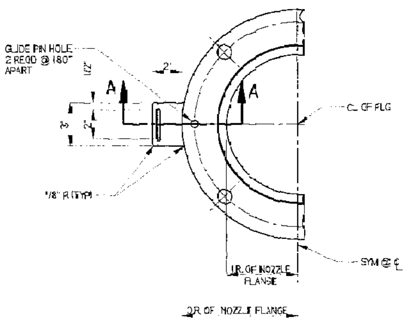

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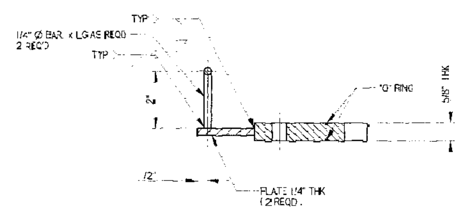
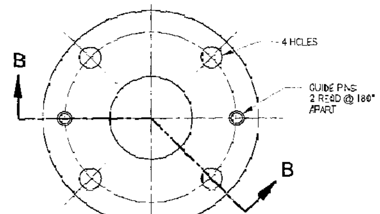


SECTION A-A

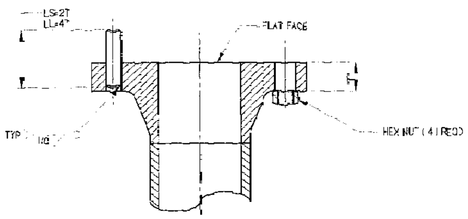
FOR ALL NOZZLES WITH FLANGE CONNECTION

GENERAL NOTES:

1. ALL BOLT HOLES SHALL STRADDLE VESSEL NATURAL CENTERLINE.
2. SELLER TO PROVIDE THE INTERNAL SPRAYJET NOZZLE (MODEL GAMAJET VIII) FOR NOZZLE N08. SPRAY NOZZLE PIPE TO BE WELDED ON THE BLIND FLANGE AND BE REMOVEABLE.
3. "Z" DIMENSION FOR SHELL NOZZLE MEASURED FROM CENTER LINE OF NOZZLE FACE.
4. SELLER TO PROVIDE NECESSARY SUPPORT/GUIDE FOR INTERNAL PARTS.
5. SELLER TO PROVIDE ONE EDUCTOR PENBERTHY MODEL CTE " SCREWED CONNECTION.
6. ALL FLANGES SHALL BE ANSI RFWN AS A MINIMUM WITH ONLY 4 BOLTS AND 2 GUIDE PINS. SELLER TO WELD NUTS ON UNDERSIDE OF FLANGE AT EACH BOLT HOLE AND TO PROVIDE TWO (2) 1/2" DIAMETER GUIDE PINS (ONE LONG (LL) AND ONE SHORT (LS)) ON THE FLANGE.
7. SELLER TO PROVIDE THE FINITE ELEMENT ANALYSIS (FEA) FOR THE DYNAMIC/STATIC PUMP LOADS WHICH WILL BE FURNISHED BY BUYER LATER.
8. INSIDE DIAMETER OF NOZZLE N11 MUST BE 9 3/4" NE.
9. DELETED



FLANGE DETAIL

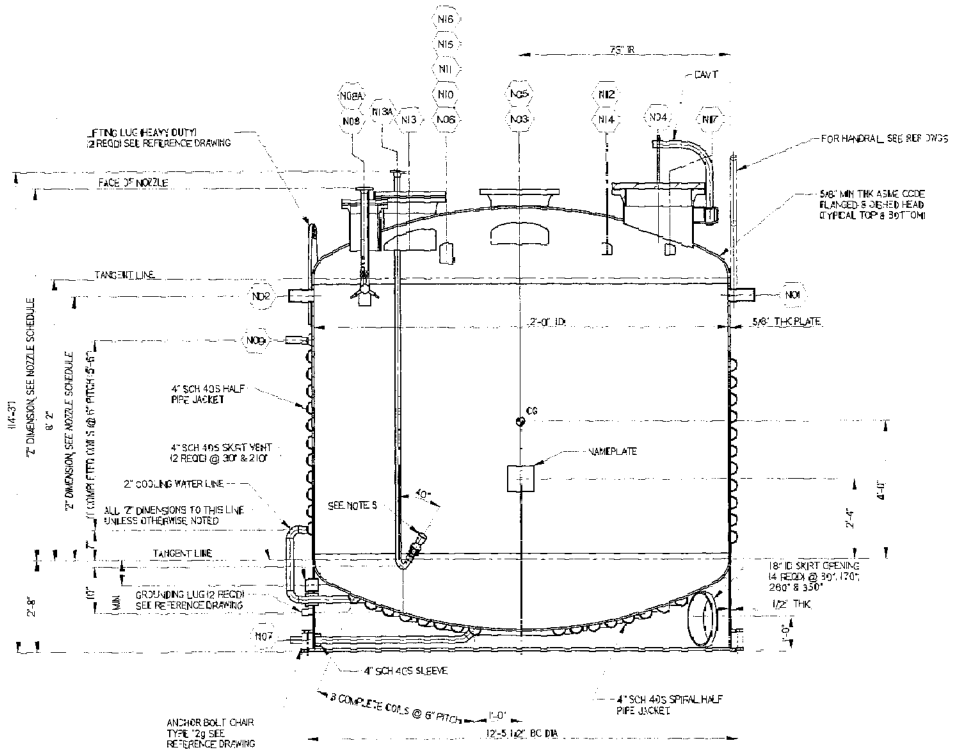


SECTION B-B

VESSEL COMPONENT QUALITY LEVELS	
COMPONENT	QUALITY LEVEL
SBS CONDENSATE VESSEL, SKIRT, ALL NOZZLES	QL-1
ALL INTERNAL SUPPORTS/PIPING	QL-1
HALF PIPE JACKET	QL-1
SPRAY JET NOZZLE EDUCTOR	CM

THIS DRAWING TO BE READ IN CONJUNCTION WITH THE MECHANICAL DATA SHEET NO 24590-LAW-MVD-LOP-P0005

PLEASE NOTE THAT SOURCE, SPECIAL NUCLEAR AND BYPRODUCT MATERIALS, AS DEFINED IN THE ATOMIC ENERGY ACT OF 1954 (AEA), ARE REGULATED AT THE U.S. DEPARTMENT OF ENERGY (DOE) FACILITIES EXCLUSIVELY BY DOE ACTING PURSUANT TO ITS AEA AUTHORITY. DOE ASSERTS, THAT PURSUANT TO THE AEA, IT HAS SOLE AND EXCLUSIVE RESPONSIBILITY AND AUTHORITY TO REGULATE SOURCE, SPECIAL NUCLEAR, AND BYPRODUCT MATERIALS AT DOE-OWNED NUCLEAR FACILITIES. INFORMATION CONTAINED HEREIN ON RADIONUCLIDES IS PROVIDED FOR PROCESS DESCRIPTION PURPOSES ONLY.



ELEVATION

FOR TRUE ORIENTATION, SEE PLAN VIEW

REFERENCE DRAWINGS		
DWG NO	REV	TITLE
24590-LAW-M6-LOP-P0002	0	P & ID
24590-WTP-MV-M59T-00001	2	PRESSURE VESSEL TOLERANCES STANDARD DETAILS
24590-WTP-MV-M59T-00009	1	LIFTING LUGS STANDARD DETAILS
24590-WTP-MV-M59T-00010	1	TAILING LUG STANDARD DETAILS
24590-WTP-MV-M59T-00007	2	THERMOWELL CONNECTION STANDARD DETAILS
24590-WTP-MV-M59T-00016001	2	VESSEL CONNECTIONS STANDARD DETAILS SHT 1 OF 3
24590-WTP-MV-M59T-00016003	0	VESSEL CONNECTIONS STANDARD DETAILS SHT 3 OF 3
24590-WTP-MV-M59T-00017	1	VESSEL INSPECTION MANWAY STANDARD DETAILS
24590-WTP-MV-M59T-00018	1	VESSEL NAME PLATE STANDARD DETAILS
24590-WTP-MV-M59T-00012	1	GROUNDING LUG
24590-WTP-MV-M59T-00025	1	ANCHOR BOLT CHAIR DETAIL FOR VERTICAL VESSELS
24590-WTP-SS-S15T-00035	0	CIVIL/STRUCTURAL STANDARDS STRUCTURAL STEEL DETAILS OHSA PIPE HANDRAILS
24590-WTP-SS-S15T-00038	4	CIVIL/STRUCTURAL STANDARDS STRUCTURAL STEEL DETAILS PIPE HANDRAILS

Q

REV	DESCRIPTION	ORG	CHKD	RVWD	APVD	DATE
0	ISSUED FOR PERMITTING USE					1/27/05

REVISION HISTORY

ISSUED BY RPP-WTP PDC	PROJECT No.	24590
	SITE	HANFORD
	AREA	200E
ISSUE STAMP	BUILDING No.	20

	BY	DATE
ORIGINATOR		
CHECKER		09/12/04
APPROVER		
REVIEWER		

CONTENT APPLICABLE TO ALARA? ☐ YES ☐ NO

ADR NO REV

RIVER PROTECTION PROJECT
WASTE TREATMENT PLANT
2435 STEVENS CENTER PLACE
RICHLAND, WA 99352

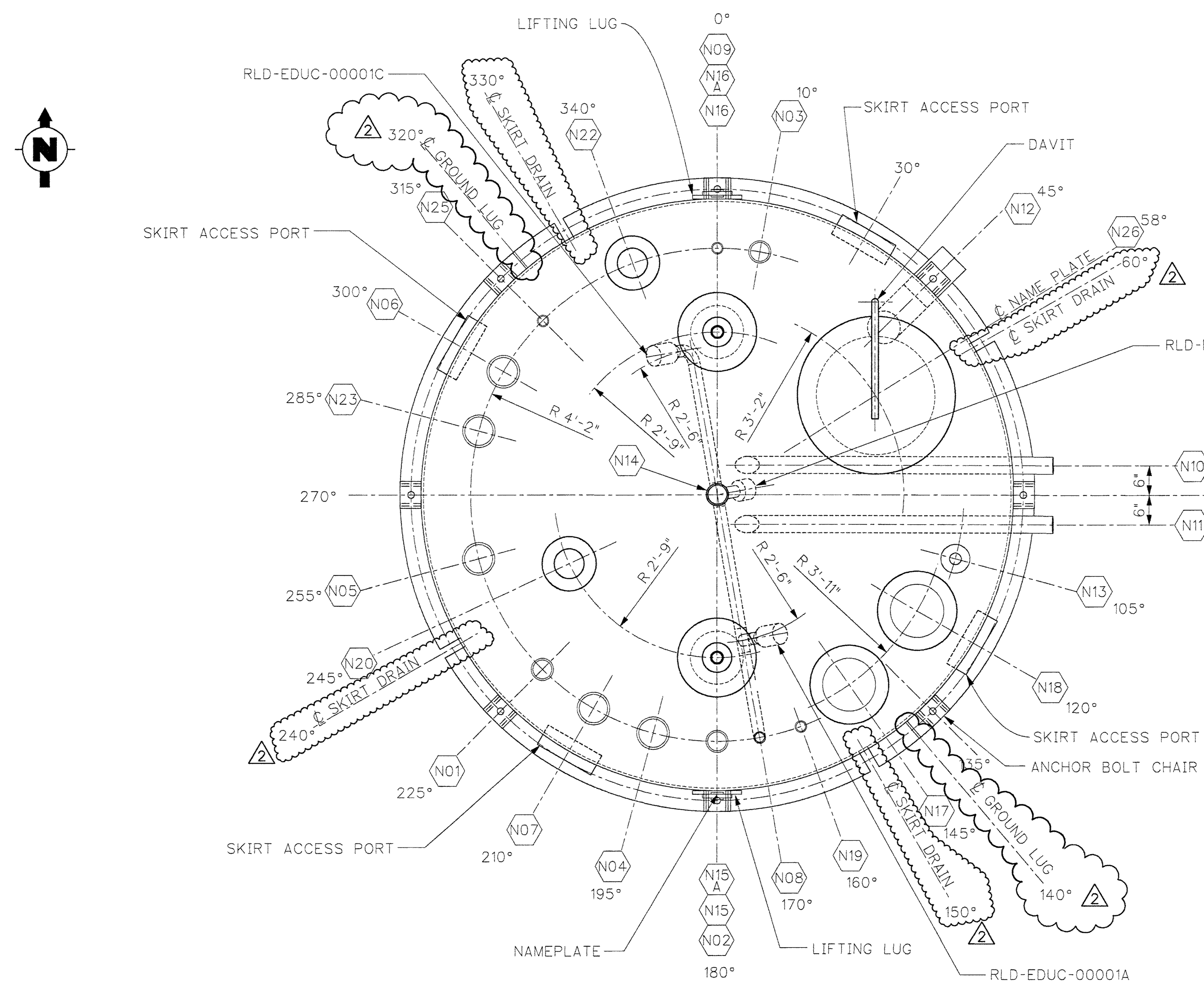
CONTRACT No: DE-AC27-01RV14136

EQUIPMENT ASSEMBLY
LAW MELTER 2 SBS CONDENSATE VESSEL
LOP-VSL-00002

SCALE: NONE | 24590-LAW-MV-LOP-P0002 | REV 0

"E" SIZE - 44x34
COMPUTER GENERATED BY SOLID EDGE - MANUAL CHANGES NOT PERMITTED
WHEN REFERENCING DRAWING AND DWG NUMBERS IN DOCUMENTS BE SURE TO INCLUDE DASHES BETWEEN ELEMENTS
07/08/2004 9:48:49 AM

NOZZLE	SIZE	SCHED/WALL	SERVICE/REMARKS	"Z" DIMENSION	REF DRAWING / DETAIL	CONN PIPE SIZE/SCHEDULE
N01	4"	80S	INLET DIP PIPE	12'-6"	24590-WTP-M59T-00016001 DET. 4	4" SCH 10S
N02	4"	80S	INLET DIP PIPE	12'-6"	24590-WTP-M59T-00016001 DET. 4	4" SCH 10S
N03	4"	80S	INLET DIP PIPE	12'-6"	24590-WTP-M59T-00016001 DET. 4	4" SCH 10S
N04	6"	80S	INLET DIP PIPE	12'-6"	24590-WTP-M59T-00016001 DET. 4	6" SCH 10S
N05	6"	80S	INLET DIP PIPE	12'-6"	24590-WTP-M59T-00016001 DET. 4	6" SCH 10S
N06	6"	80S	INLET DIP PIPE	12'-6"	24590-WTP-M59T-00016001 DET. 4	6" SCH 10S
N07	6"	80S	INLET DIP PIPE	12'-6"	24590-WTP-M59T-00016001 DET. 4	6" SCH 10S
N08	2"	160S	INLET TO RLD-EDUC-00001A/B/C	12'-6"	24590-WTP-M59T-00016001 DET. 3	2" SCH 40S
N09	2"	80S	INLET	12'-6"	24590-WTP-M59T-00016001 DET. 2	2" SCH 40S
N10	3"	80S	OUTLET	6 1/2"	24590-WTP-M59T-00016001 DET. 3	3" SCH 10S
N11	3"	80S	OUTLET	6 1/2"	24590-WTP-M59T-00016001 DET. 3	3" SCH 10S
N12	8"	80S	OVERFLOW DIP PIPE	10'-3 1/2"	24590-WTP-M59T-00016001 DET. 4	8" SCH 10S
N13	1"	0.5925	PRESSURE	12'-6"	24590-WTP-M59T-00016002 DET. 15	150# RF FLANGE
N14	4"	80S	VENT	13'-5"	24590-WTP-M59T-00016001 DET. 1	4" SCH 10S
N15	10"	40S	SPRAY NOZZLE	13'-3"	24590-WTP-M59T-00016001 DET. 9	150# RF FLANGE
N15A	2"	80S	INLET TO RLD-NOZ-00007	13'-10"	SEE DETAIL "1"	150# RF FLANGE
N16	10"	40S	SPRAY NOZZLE	13'-3"	24590-WTP-M59T-00016001 DET. 9	150# RF FLANGE
N16A	2"	80S	INLET TO RLD-NOZ-00006	13'-10"	SEE DETAIL "1"	150# RF FLANGE
N17	10"	40S	RADAR	12'-11"	SEE DETAIL "2"	150# RF FLANGE
N18	10"	40S	RADAR	12'-11"	SEE DETAIL "2"	150# RF FLANGE
N19	1"	0.5925	TEMPERATURE	12'-6"	24590-WTP-M59T-00007 AND DET. 3	1" FNPT
N20	6"	80S	SPARE	13'-3"	24590-WTP-M59T-00016001 DET. 9	150# RF FLANGE, BLIND
N22	6"	80S	SPARE DIP PIPE	12'-6"	24590-WTP-M59T-00016001 DET. 11	150# RF FLANGE, BLIND
N23	6"	80S	INLET DIP PIPE	12'-6"	24590-WTP-M59T-00016001 DET. 4	6" SCH 10S
N25	2"	160S	INLET DIP PIPE	12'-6"	24590-WTP-M59T-00016001 DET. 4	2" SCH 40S
N26	24"	1/2" PLATE	MANWAY	13'-6"	24590-WTP-M59T-00017 DET. 2	150# RF BLIND FLG. DAVIT



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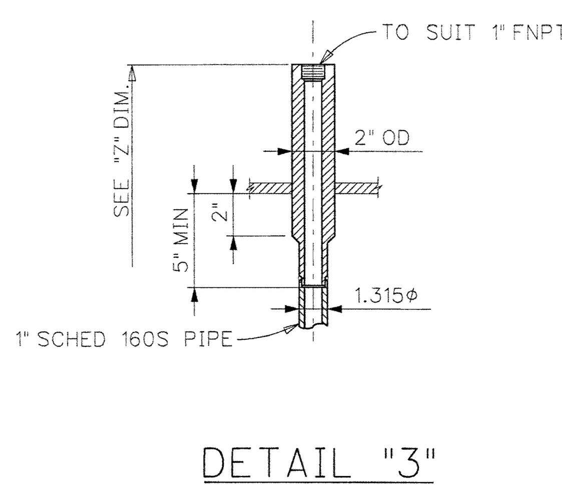
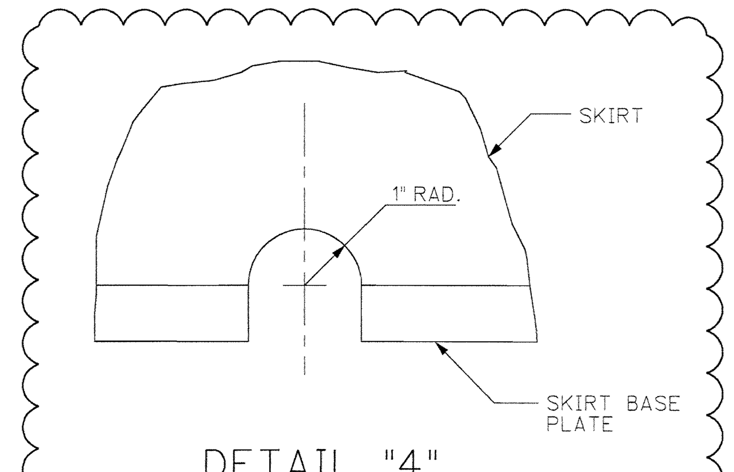


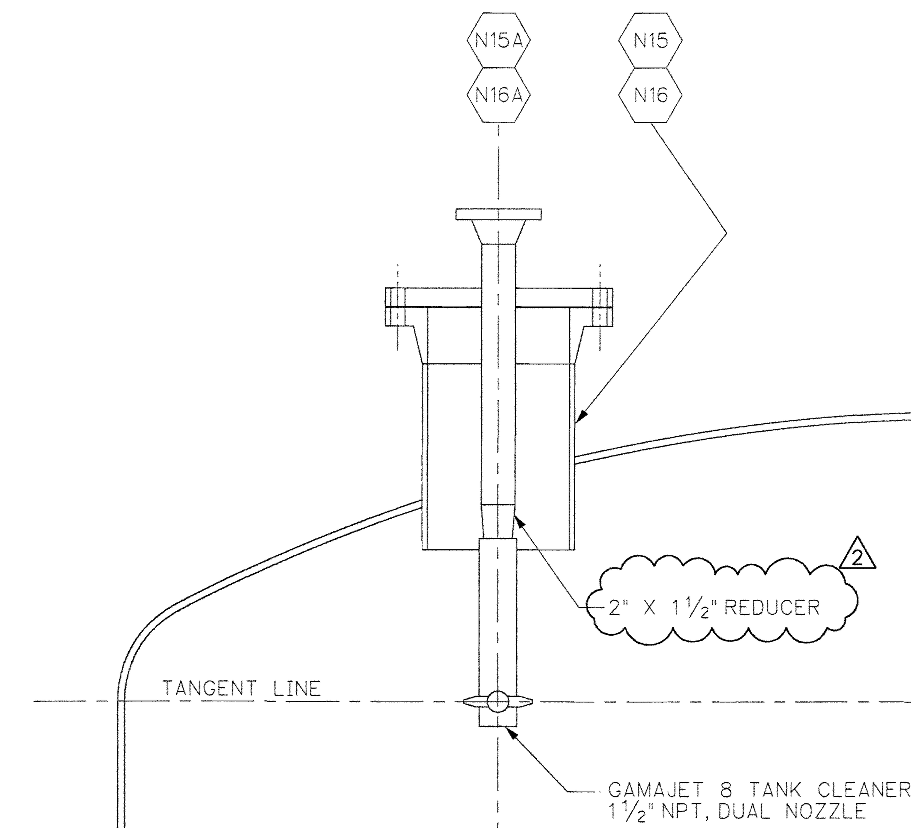
DETAIL "3"
NOZZLE "N19"



DETAIL "4"
SKIRT DRAIN
(4) REQUIRED

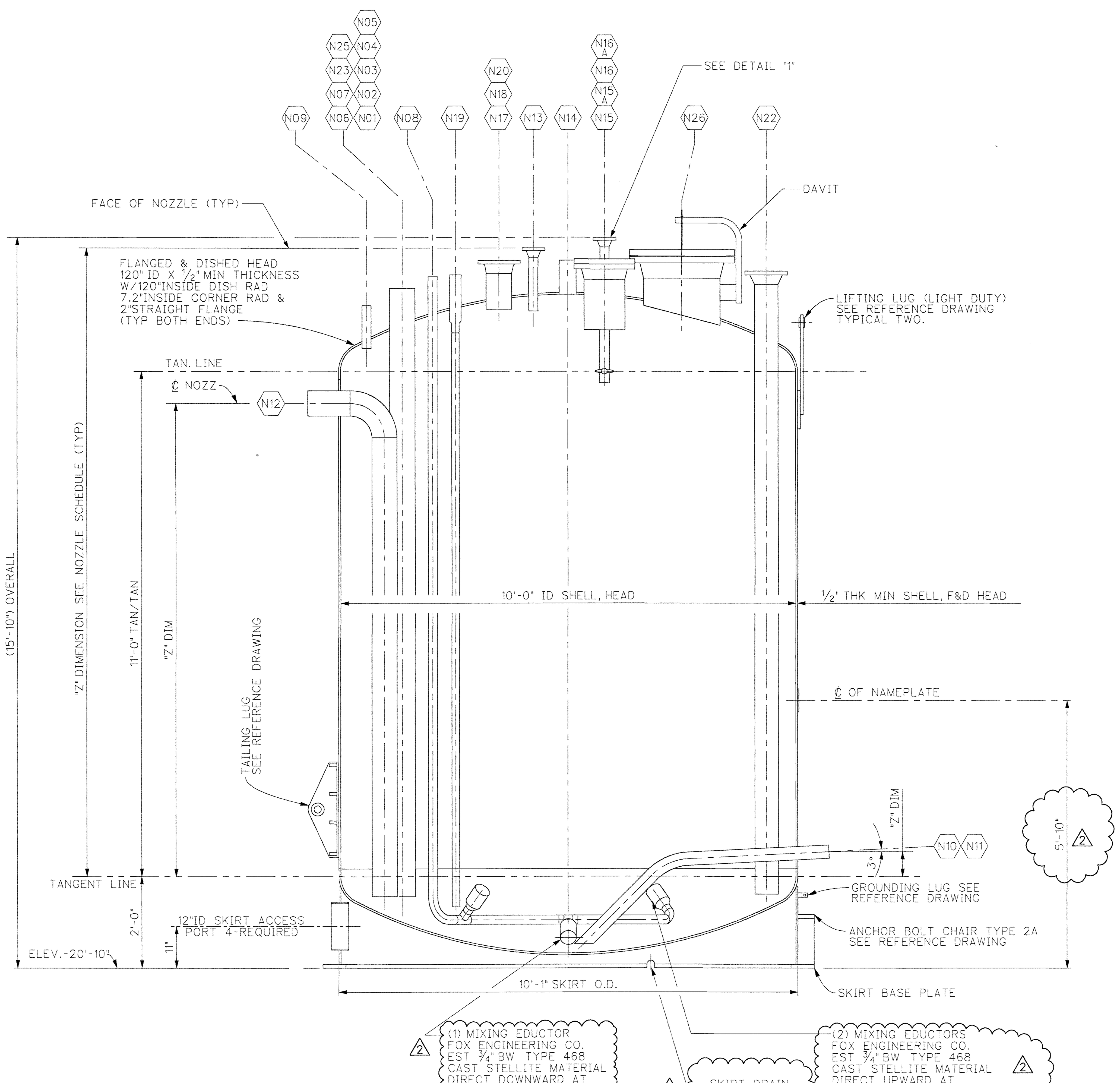
GENERAL NOTES :

1. DELETED
2. DELETED
3. 100 % RT: VESSEL CIRCUMFERENTIAL AND LONGITUDINAL SEAMS, MANWAY NECK LONGITUDINAL SEAM AND SKIRT LONGITUDINAL SEAM.
4. 100 % DPI: ALL ROOT AND FINAL WELDS.
5. 100 % UT: ALL NOZZLE WELDS.
6. CLOSING VESSEL SEAM TO HAVE FULL VISUAL INSPECTION ON SECOND SIDE.
7. ALL LIFTING LUGS ATTACHMENT AREAS ON SHELL TO BE 100 % UT. SEE FABRICATION SPECIFICATION 24590-WTP-3PS-MV00-T00001.
8. DELETED
9. BOLT HOLES IN FLANGE SHALL STRADDLE VESSEL NATURAL CENTERLINES.
10. DELETED
11. ALL INTERNAL DIP PIPES SHALL EXTEND TO 6" ABOVE THE BOTTOM HEAD.
12. ADDED SKIRT DRAINS, REVISED NOTE 5 PER 24590-WTP-SDDR-PROC-02-0069. LOCATED NAME PLATE, DELETED NOTE 10, RELOCATED GROUND LUGS.

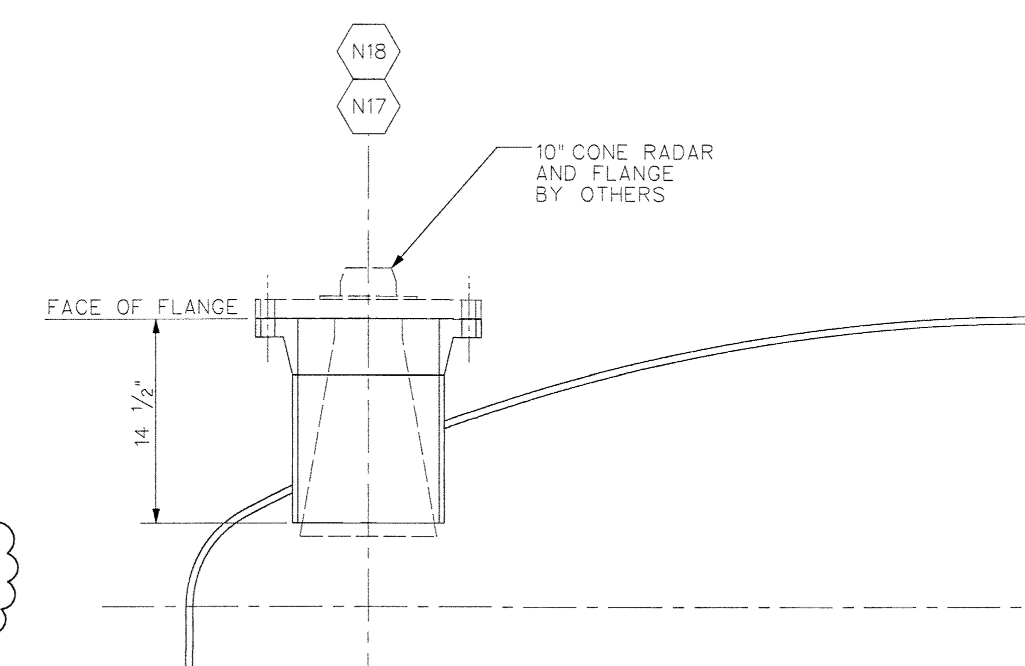


DETAIL "1"

THIS DRAWING TO BE READ IN CONJUNCTION WITH THE MECHANICAL DATA SHEET 24590-LAW-MVD-RLD-P0001



SECTION
SEE PLAN FOR TRUE ORIENTATION



DETAIL "2"

REFERENCE DRAWINGS		
DWG NO	REV	TITLE
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24590-WTP-MV-M59T-00001	0	PRESSURE VESSEL TOLERANCES STANDARD DETAILS
24590-WTP-MV-M59T-00007	0	THERMOWELL CONNECTION STANDARD DETAILS
24590-WTP-MV-M59T-00009	0	HEAVY DUTY LIFTING LUGS STANDARD DETAILS
24590-WTP-MV-M59T-00010	0	TAILING LUG STANDARD DETAILS
24590-WTP-MV-M59T-00012	0	GROUNDING LUG STANDARD DETAILS
24590-WTP-MV-M59T-00016001	0	VESSEL CONNECTIONS STANDARD DETAILS
24590-WTP-MV-M59T-00017	0	VESSEL INSPECTION MANWAY STANDARD DETAILS
24590-WTP-MV-M59T-00026	0	ANCHOR BOLT CHAIR DETAILS FOR VERTICAL VESSEL
24590-WTP-MV-M59T-00016002	0	VESSEL CONNECTIONS STANDARD DETAILS
24590-WTP-MV-M59T-00018	1	VESSEL NAME PLATE STANDARD DETAILS

MARK W. HOFFMANN STATE OF WASHINGTON 0030952 REGISTERED PROFESSIONAL ENGINEER
4/29/03
EXPIRES 12/10/04

REV	DESCRIPTION	ORG	CHKD	RVWD	APVD	DATE
2	ISSUED FOR PERMITTING USE	JD	RDG	[illegible]	[illegible]	4-29-03
1	ISSUED FOR PERMITTING USE	JJ	CS	MH	MH	4-03-03
0	ISSUED FOR PERMITTING USE	JJ	CS	N/A	SK	10-03-02

REVISION HISTORY

ISSUED BY RPP-WTP PDC
LD 4-29-03
INIT DATE
ISSUE STAMP

PROJECT No.	24590	
SITE	HANFORD	
AREA	200E	
BUILDING No.	20	
	BY	DATE
ORIGINATOR	JESSICA JACKSON	10-02-02
CHECKER	CLIFF SLATER	10-03-02
APPROVER	SUZANNE KIRK	10-03-02
REVIEWER	N/A	

BECHTEL

RIVER PROTECTION PROJECT
WASTE TREATMENT PLANT
2435 STEVENS CENTER PLACE
RICHLAND, WA 99352

CONTRACT No: DE-AC27-01RV14136

R10054052

EQUIPMENT ASSEMBLY C3/C5 DRAINS/SUMP COLLECTION VESSEL RLD-VSL-00004

CONTENT APPLICABLE TO ALARA? [ ]YES [ ]NO
ADR NO. REV:
DIM REFERENCE No.

SCALE: NONE

24590-LAW-MV-RLD-P0001

REV 2

'E' SIZE - 44x34
COMPUTER GENERATED - MANUAL CHANGES NOT PERMITTED

WHEN REFERENCING DRAWING AND DIM NUMBERS IN DOCUMENTS, BE SURE TO INCLUDE DASHES BETWEEN ELEMENTS

04/28/2003 02:33:34 PM

PLOTTED BY: jrwilli3
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FORM E_SDN.DGN 02/2003

MASTER DISTRIBUTION SCHEDULE

Project Name:

Document Distribution:

Document Number: 24590-LAW-MV-RLD-P0001

Revision: 2

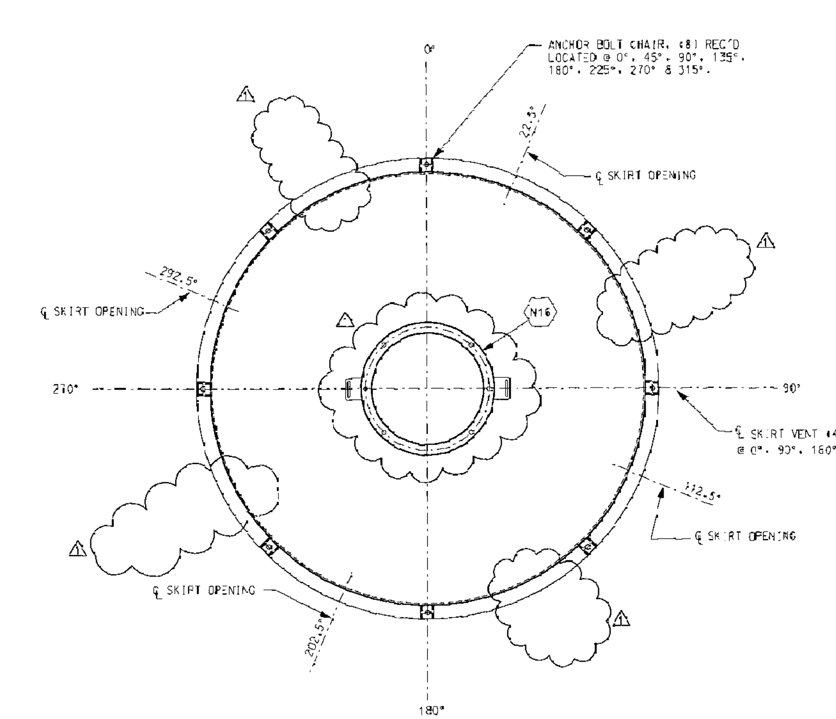
Insert rows as necessary ↑

Name	MSIN	Controlled	Uncontrolled	Size: 8 ½ x 11 (A)	11 x 17 (B)	17 x 22 (C)	22 x 34 (D)	Full (E)	As Is	Comments
NA										

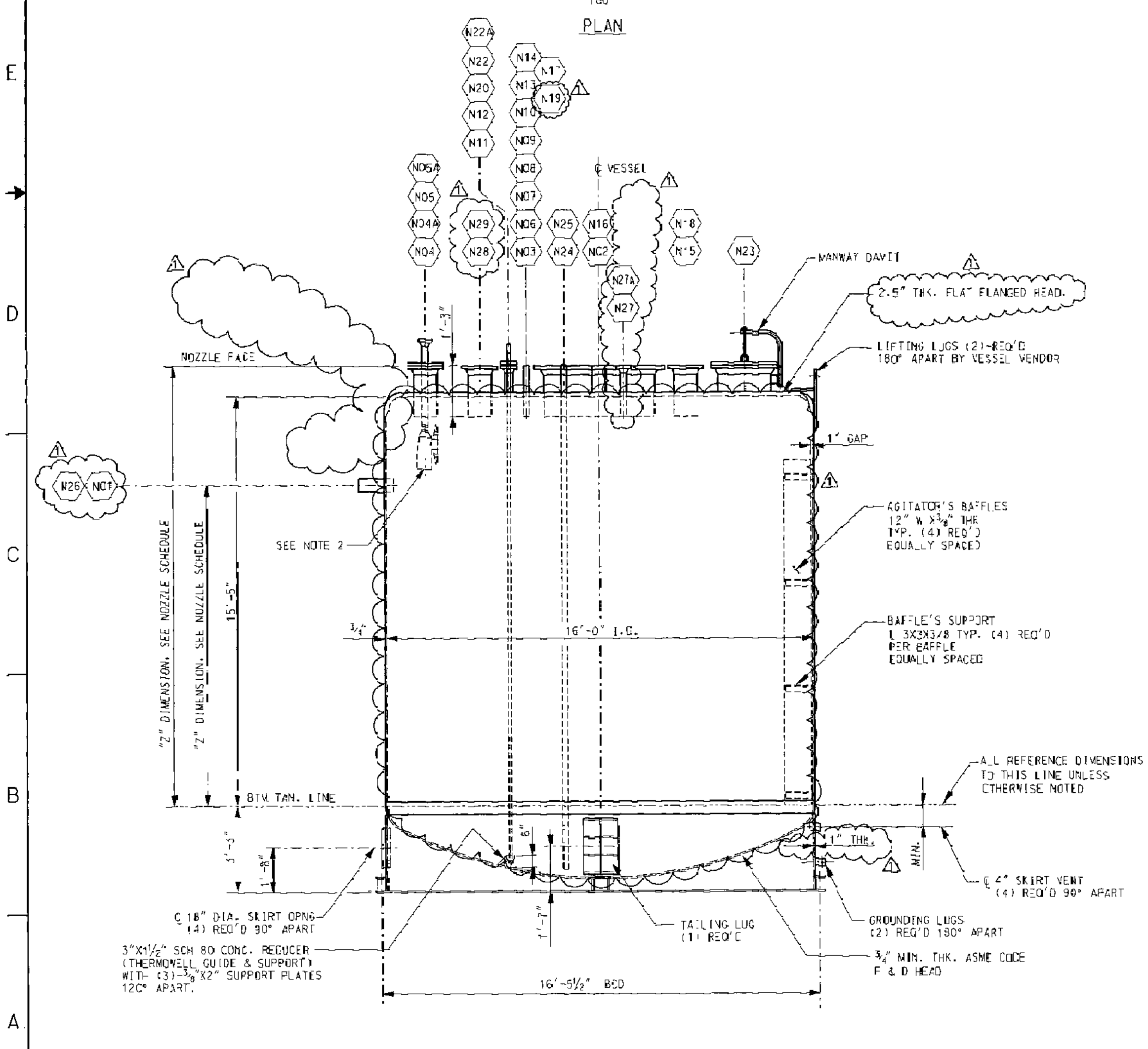
Mark Hoffmann
Approver's Name (Print)

Approver's Signature

4/29/03
Date

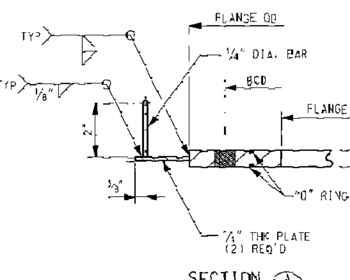


PLAN

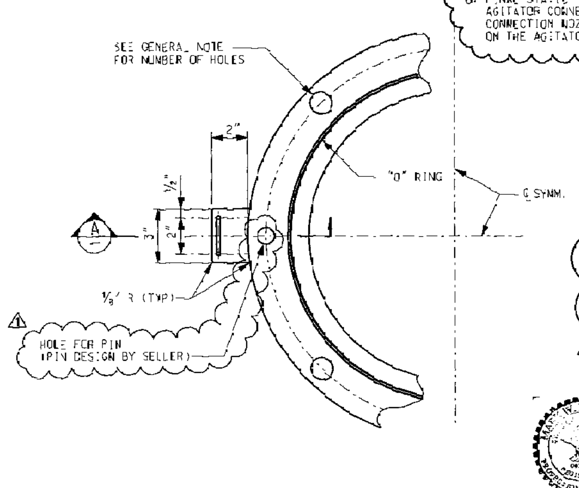


ELEVATION

SEE PLAN FOR TRUE ORIENTATION



SECTION A



"C" RING FLANGE DETAIL

NOZZLE	SIZE	SCHED/WALL	SERVICE/REMARKS	"Z" DIM	REF DWG/DET	CONN PIPE SIZE/SCHED
N01	6"	80S	OVERFLOW	169"	24590-WTP-MV-M59T-00016001 DTL 2	6"-10S
N02	4"	80S	VESSEL VENT	199"	24590-WTP-MV-M59T-00016001 DTL 1	4"-40S
N03	2"	160S	INLET SAMPLE RETURN	199"	24590-WTP-MV-M59T-00016001 DTL 2	2"-40S
N04	10"	40S	SPRAY NOZZLE HOLDER	199"	BY SELLER	*
N04A	2"	160S	INLET TO SPRAY NOZZLE	209"	BY SELLER	FLANGED
N05	10"	40S	SPRAY NOZZLE HOLDER	199"	BY SELLER	*
N05A	2"	160S	INLET TO SPRAY NOZZLE	209"	BY SELLER	FLANGED
N06	2"	160S	SPARE WITH CAP	199"	24590-WTP-MV-M59T-00016001 DTL 2	2"-10S
N07	2"	160S	EFFLUENT FROM RLD-PMP-00004	199"	24590-WTP-MV-M59T-00016001 DTL 2	2"-40S
N08	2"	160S	MELTER FEED/PREP VESSEL WASH	199"	24590-WTP-MV-M59T-00016001 DTL 2	2"-80S
N09	2"	160S	DIW HEADER DRAIN	199"	24590-WTP-MV-M59T-00016001 DTL 2	2"-40S
N10	2"	160S	C3/C5 DRAINS FROM RLD-PMP-00002A/B	199"	24590-WTP-MV-M59T-00016001 DTL 2	2"-40S
N11	2"	160S	VESSEL WASH FROM LCP-VSL-00002	199"	24590-WTP-MV-M59T-00016001 DTL 2	2"-80S
N12	2"	160S	MELTER FEED/PREP VESSEL WASH	199"	24590-WTP-MV-M59T-00016001 DTL 2	2"-80S
N13	2"	160S	VESSEL WASH FROM LCP-VSL-00001	199"	24590-WTP-MV-M59T-00016001 DTL 2	2"-80S
N14	3"	80S	C1/C2 EFFLUENT FROM NLD-PMP-00003A/B	199"	24590-WTP-MV-M59T-00016001 DTL 2	3"-40S
N15	20" I.D.	BY SELLER	PUMP CONNECTION	199"	24590-WTP-MV-M59T-00016001 DTL 9	**
N16	50" I.D.	BY SELLER	AGITATOR CONNECTION	203"	24590-WTP-MV-M59T-00016001 DTL 9	**
N17	3"	160S	RECIRCULATION INLET	199"	24590-WTP-MV-M59T-00016001 DTL 2	3"-10S
N18	20" I.D.	BY SELLER	PUMP CONNECTION	199"	24590-WTP-MV-M59T-00016001 DTL 9	**
N19	4"	160S	INLET	199"	24590-WTP-MV-M59T-00016001 DTL 2	4"-40S
N20	2"	160S	EFFLUENT FROM C3/C5 S.P. W/ DIP PIPE	199"	24590-WTP-MV-M59T-00016001 DTL 4	2"-40S
N21			DELETED			
N22	3"	80S	THERMOWELL HOLDER	199"	24590-WTP-MV-M59T-00016001 DTL 9	*
N22A	1"	160S	THERMOWELL, REMOVABLE	207"	24590-WTP-MV-M59T-00007 DTL 7	¾"-NPTF
N23	24"	½" THK PL	MANWAY W/ BLIND AND DAVIT	199"	24590-WTP-MV-M59T-00017 DTL 2	*
N24	2"	160S	SPARE W/ DIP PIPE	199"	24590-WTP-MV-M59T-00016001 DTL 4	CAPPED
N25	2"	160S	SPARE	199"	24590-WTP-MV-M59T-00016001 DTL 2	CAPPED
N26	6"	80S	OVERFLOW FROM RLD-VSL-00005	TBD	24590-WTP-MV-M59T-00016001 DTL 2	6"-10S
N27	2"	80S	PRESSURE TRANSMITTER HOLDER	199"	24590-WTP-MV-M59T-00016001 DTL 9	FLANGED
N27A	¾"	N/A	PRESSURE TRANSMITTER	199"	SEE NOTE 18	¾"-NPTF
N27B			DELETED			
N27C			DELETED			
N28	10"	40S	INSTRUMENT (LEVEL/RADAR)	199"	24590-WTP-MV-M59T-00016003 DTL 25	FLANGED
N29	10"	40S	INSTRUMENT (LEVEL/RADAR)	199"	24590-WTP-MV-M59T-00016003 DTL 25	FLANGED

* FLANGED & BLIND FLANGED W/ "O" RING FLANGE, TWO PINS THREE GASKETS, BOLTS AND NUTS

** FLANGED W/ "O" RING FLANGE, TWO PINS & THREE GASKETS

GENERAL NOTES:

1. NOZZLE BOLT HOLES SHALL STRADDLE NORMAL VESSEL CENTER LINES.
2. SELLER TO PROVIDE THE INTERNAL SPRAY JET NOZZLE (MODEL GAMAJET VIII OR EQUAL) FOR NOZZLE N04A & N05A. SPRAY NOZZLE PIPE TO BE WELDED ON THE BLIND FLANGE AND BE REMOVABLE. N04A & N05A SHALL BE 180° APART.
3. "Z" DIMENSION FOR SHELL NOZZLE MEASURED FROM CENTER LINE OF NOZZLE FACE.
4. SELLER TO PROVIDE NECESSARY SUPPORT/GUIDE FOR INTERNAL PARTS.
5. FOR NOZZLE WITH FLANGE CONNECTION, USE STANDARD ANSI B16.5 150# RFWN FLANGE EXCEPT FOR NOZZLES N04, N05, N15, N16 AND N18 WILL BE CUSTOM DESIGN.
6. FOR NOZZLE WITH "O" RING FLANGE, FLANGE FACING WILL BE SMOOTH GROOVE FOR "O" RING GASKET.
7. FOR DISTANCE OF DIP PIPES TO BOTTOM HEAD, USE 6" CLEARANCE UNLESS OTHERWISE SPECIFIED.
8. NUMBER OF BOLT HOLES FOR FLANGED NOZZLES SHALL BE PER ANSI STANDARD UNLESS OTHERWISE SPECIFIED.
9. NUMBER OF BOLT HOLES FOR NOZZLES N04, N05, N15, N16 AND N18 SHALL BE MINIMIZED TO 4.
10. SELLER TO VERIFY ALL FLANGES DIMENSION.
11. DELETED
12. ASSUME AGITATOR NOZZLE LOAD AS FOLLOWS:
    - BENDING MOMENT: 150,000 IN-LBS
    - TORQUE: 60,000 IN-LBS
    - VERTICAL DOWNWARD LOAD: 15,000 LBS
13. ASSUME 7000 LBS VERTICAL DOWNWARD LOAD, 10,000 IN-LBS TORQUE AND 50,000 IN-LBS BENDING MOMENT FOR PUMP CONNECTION NOZZLES.
14. ANCHOR BOLTS SHALL BE PROVIDED BY OTHERS.
15. THERMOWELL SHALL BE WELDED TO BLIND FLANGE OF NOZZLE N22A.
16. ALL NOZZLE FLANGES SHALL BE PROVIDED WITH NUTS WELDED UNDERSIDE OF THE FLANGES.
17. REVISE NOZZLE TABLE BASED ON P & ID REVISION.
18. BORE AND TAP BLIND FLANGE FOR ¾" NPTF

THIS DRAWING TO BE READ IN CONJUNCTION WITH THE MECHANICAL DATA SHEET NO 24590-LAW-MVD-RLD-P0007

HOLDS:

1. FINAL INTERNALS DESIGN, PENDING CONFIRMATION ON THE AGITATOR DESIGN.
2. FINAL NOZZLES SIZE, PENDING FINAL NOZZLES SIZING BY SYSTEM.
3. LOCATION OF NOZZLES AND NAME PLATE, PENDING FINAL DESIGN BY PLANT DESIGN.
4. LOCATION OF LIFTING LUGS AND TAILING LUG, PENDING REVIEW BY CONSTRUCTION.
5. LOCATION OF GROUNDING LUGS, PENDING REVIEW BY ELECTRICAL.
6. FINAL STATIC LOADS AND DYNAMIC LOADS FOR AGITATOR CONNECTION NOZZLE AND PUMPS CONNECTION NOZZLES, PENDING CONFIRMATION ON THE AGITATOR AND PUMPS DESIGN.

REFERENCE DRAWINGS

DWG NO	REV	TITLE
24590-WTP-MV-M59T-00001	1	PRESSURE VESSEL TOLERANCES STANDARD DETAILS
24590-WTP-MV-M59T-00007	2	THERMOWELL CONNECTION STANDARD DETAILS
24590-WTP-MV-M59T-00016001	2	VESSEL CONNECTIONS STANDARD DETAILS SHT 1 OF 3
24590-WTP-MV-M59T-00016002	1	VESSEL CONNECTIONS STANDARD DETAILS SHT 2 OF 3
24590-WTP-MV-M59T-00016003	0	VESSEL CONNECTIONS STANDARD DETAILS SHT 3 OF 3
24590-WTP-MV-M59T-00009	1	LIFTING LUGS STANDARD DETAILS
24590-WTP-MV-M59T-00010	1	TAILING LUG STANDARD DETAILS
24590-WTP-MV-M59T-00012	1	GROUNDING LUG STANDARD DETAILS
24590-WTP-MV-M59T-00017	1	VESSEL INSPECTION MANWAY STANDARD DETAILS
24590-WTP-MV-M59T-00018	1	VESSEL NAME PLATE STANDARD DETAILS
24590-WTP-MV-M59T-00026	1	ANCHOR BOLT CHAIR DETAILS FOR VERTICAL VESSELS
24590-LAW-M6-RLD-P0001	0	P&ID-LAW PLANT WASH & SBS CONDENSATE COLLECTION

PLEASE NOTE THAT SOURCE, SPECIAL NUCLEAR AND BYPRODUCT MATERIALS, AS DEFINED IN THE ATOMIC ENERGY ACT OF 1954 (AEA), ARE REGULATED AT THE U.S. DEPARTMENT OF ENERGY (DOE) FACILITIES EXCLUSIVELY BY DOE ACTING PURSUANT TO ITS AEA AUTHORITY. DOE ASSERTS, THAT PURSUANT TO THE AEA, IT HAS SOLE AND EXCLUSIVE RESPONSIBILITY AND AUTHORITY TO REGULATE SOURCE, SPECIAL NUCLEAR, AND BYPRODUCT MATERIAL AT DOE-OWNED NUCLEAR FACILITIES. INFORMATION CONTAINED HEREIN ON RADIONUCLIDES IS PROVIDED FOR PROCESS DESCRIPTION PURPOSES ONLY.

REVISION HISTORY

REV	DESCRIPTION	ORG	CHKD	RVWD	APVD	DATE
1	ISSUED FOR PERMITTING USE					11/17/03
0	ISSUED FOR PERMITTING USE	JJ	CS		SK	10/28/02

ISSUED BY RPP-WTP PDC 11/18/03 — ISSUE STAMP

PROJECT No.	24590
SITE	HANFORD
AREA	200E
BUILDING No.	20

	BY	DATE
ORIGINATOR	JESSICA JACKSON	10/22/02
CHECKER	CLIFF SLATER	10/22/02
APPROVER	SUZANNE KIRK	10/28/02
REVIEWER		

CONTENT APPLICABLE TO ALARA? [ ] YES [ ] NO
ADR NO. REV.
DIM REFERENCE No.

RIVER PROTECTION PROJECT
WASTE TREATMENT PLANT
2435 STEVENS CENTER PLACE
RICHLAND, WA 99352

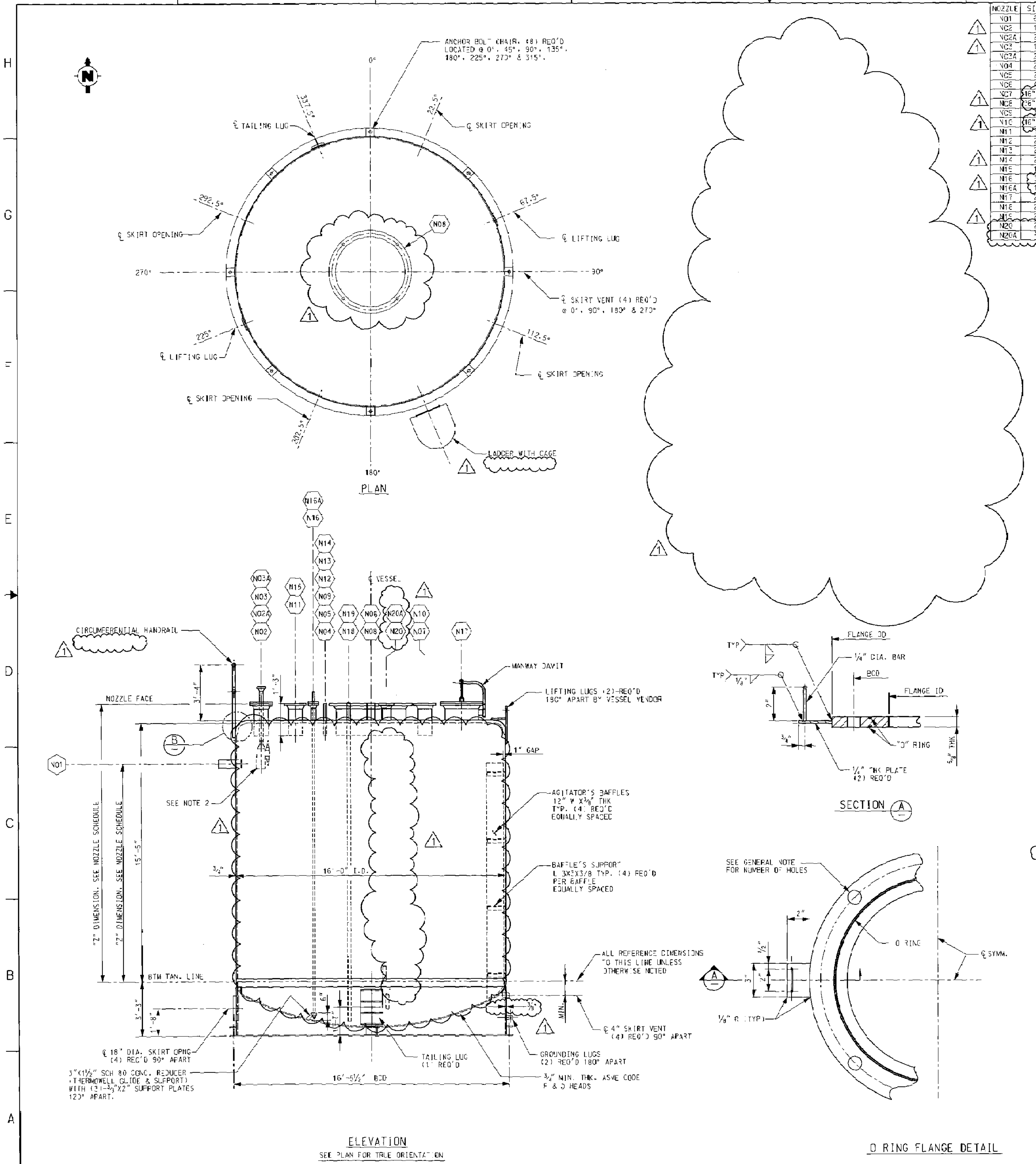
CONTRACT No: DE-AC27-01RV14136

EQUIPMENT ASSEMBLY PLANT WASH VESSEL RLD-VSL-00003

SCALE: NTS
24590-LAW-MV-RLD-P0002
REV 1

'E' SIZE - 44x34
COMPUTER GENERATED - MANUAL CHANGES NOT PERMITTED
WHEN REFERENCING DRAWING AND DIN NUMBERS IN DOCUMENTS, BE SURE TO INCLUDE DASHES BETWEEN ELEMENTS
03/10/2003 03:27:16 PM
PLOTTED BY: jrwill3

24590-LAW-MV-RLD-P0003



NOZZLE	SIZE	SCHED/WALL	SERVICE/REMARKS	"Z" DIM	REF DWG/DET	CONN PIPE SIZE/SCHED
N01	6"	80S	OVERFLOW	169"	24590-WTP-MV-M59T-00016001 DTL 2	6"-10S
N02	10"	40S	SPRAY NOZZLE HOLDER	199"	24590-WTP-MV-M59T-00016001 DTL 3	*
N02A	2"	160S	INLET TO SPRAY NOZZLE	209"	BY SELLER	FLANGED
N03	10"	40S	SPRAY NOZZLE HOLDER	199"	24590-WTP-MV-M59T-00016001 DTL 9	*
N03A	2"	160S	INLET TO SPRAY NOZZLE	209"	BY SELLER	FLANGED
N04	2"	160S	INLET FROM RLD-PMP-00002A/B	199"	24590-WTP-MV-M59T-00016001 DTL 2	2"-40S
N05	2"	160S	INLET SAMPLE RETURN	199"	24590-WTP-MV-M59T-00016001 DTL 2	2"-40S
N06	4"	80S	VESSEL VENT	199"	24590-WTP-MV-M59T-00016001 DTL 1	4"-40S
N07	16" ID	BY SELLER	PUMP CONNECTION	199"	24590-WTP-MV-M59T-00016001 DTL 9	**
N08	26" ID	BY SELLER	AGITATOR CONNECTION	203"	24590-WTP-MV-M59T-00016001 DTL 9	**
N09	3"	80S	RECIRCULATION INLET	199"	24590-WTP-MV-M59T-00016001 DTL 2	3"-10S
N10	16" ID	BY SELLER	PUMP CONNECTION	199"	24590-WTP-MV-M59T-00016001 DTL 9	**
N11	10"	40S	INSTRUMENT (LEVEL/RADAR)	199"	24590-WTP-MV-M59T-00016001 DTL 9	FLANGED
N12	2"	160S	INLET CONDENSATE	199"	24590-WTP-MV-M59T-00016001 DTL 2	2"-40S
N13	2"	160S	INLET CONDENSATE	199"	24590-WTP-MV-M59T-00016001 DTL 2	2"-40S
N14	2"	160S	SPARE	199"	24590-WTP-MV-M59T-00016001 DTL 2	CAPPED
N15	10"	40S	INSTRUMENT (LEVEL/RADAR)	199"	24590-WTP-MV-M59T-00016001 DTL 9	FLANGED
N16	3"	80S	THERMOWELL HOLDER	199"	24590-WTP-MV-M59T-00016001 DTL 9	*
N16A	1"	160S	THERMOWELL REMOVABLE	207"	24590-WTP-MV-M59T-00007 DTL 7	3/4" NPTF
N17	24"	1/2" THK PL	MANWAY W/ BLIND AND DAVIT	199"	24590-WTP-MV-M59T-00017 DTL 2	*
N18	2"	160S	SPARE W/ DIP PIPE	199"	24590-WTP-MV-M59T-00016001 DTL 4	CAPPED
N19	2"	160S	SPARE	199"	24590-WTP-MV-M59T-00016001 DTL 2	CAPPED
N20	2"	80S	PRESSURE TRANSMITTER HOLDER	199"	24590-WTP-MV-M59T-00016002 DTL 9	FLANGED
N20A	3/4"	N/A	PRESSURE TRANSMITTER	199"	SEE NOTE 16	3/4" NPTF

* FLANGED & BLIND FLANGED W/ "O" RING FLANGE, TWO GASKETS, BOLTS AND NUTS

** FLANGED W/ "O" RING FLANGE & TWO GASKETS

GENERAL NOTES:

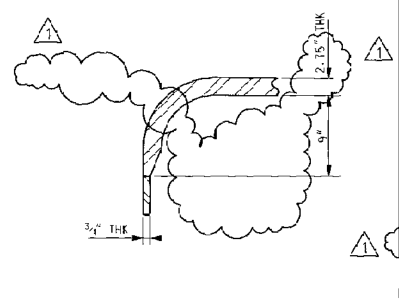
1. NOZZLE BOLT HOLES SHALL STRADDLE NORMAL VESSEL CENTER LINES.
2. SELLER TO PROVIDE THE INTERNAL SPRAY JET NOZZLE (MODEL GAMAJET VIII OR EQUAL) FOR NOZZLE N02A & N03A. SPRAY NOZZLE PIPE TO BE WELDED ON THE BLIND FLANGE AND BE REMOVABLE.
3. "Z" DIMENSION FOR SHELL NOZZLE MEASURED FROM CENTER LINE OF NOZZLE FACE.
4. SELLER TO PROVIDE NECESSARY SUPPORT/GUIDE FOR INTERNAL PARTS.
5. FOR NOZZLE WITH FLANGE CONNECTION, USE STANDARD ANSI B16.5 150# RFWN FLANGE EXCEPT FOR NOZZLE N02, N03, N07, N08 AND N10 WILL BE CUSTOM DESIGN.
6. FOR NOZZLES WITH "O" RING FLANGE, FLANGE FACING WILL BE SMOOTH GROOVE FOR "O" RING GASKET.
7. FOR DISTANCE OF DIP PIPES TO BOTTOM HEAD, USE 6" CLEARANCE UNLESS OTHERWISE SPECIFIED.
8. NUMBER OF BOLT HOLES FOR FLANGED NOZZLES SHALL BE PER ANSI STANDARD UNLESS OTHERWISE SPECIFIED.
9. NUMBER OF BOLT HOLES FOR NOZZLES N02, N03, N07, N08 & N10 SHALL BE MINIMIZED TO 4.
10. SELLER TO VERIFY ALL FLANGES DIMENSION.
11. SELLER TO PROVIDE 360° HANDRAIL, LADDER AND LADDER CAGE.
12. FOR BID PURPOSE, ASSUME AGITATOR NOZZLE LOAD AS FOLLOWS:
    - BENDING MOMENT: 150,000 IN-LBS
    - TORQUE: 60,000 IN-LBS
    - VERTICAL DOWNWARD LOAD: 15,000 LBS
13. ASSUME 7000 LBS VERTICAL DOWNWARD LOAD, 10,000 IN-LBS TORQUE AND 50,000 IN-LBS BENDING MOMENT FOR PUMP CONNECTION NOZZLES.
14. ANCHOR BOLTS SHALL BE PROVIDED BY OTHERS.
15. THERMOWELL SHALL BE WELDED TO BLIND FLANGE OF NOZZLE N16A.
16. BORE AND TAP BLIND FLANGE FOR 3/4" NPTF.

HOLDS:

1. FINAL NOZZLE LOCATION, ORIENTATION AND SIZE.
2. LOCATION FOR NAME PLATE, BRACKET AND GROUNDING LUGS.
3. LOCATION OF LADDER.

THIS DRAWING TO BE READ IN CONJUNCTION WITH THE MECHANICAL DATA SHEET NO 24590-LAW-MVD-RLD-P0006

PLEASE NOTE THAT SOURCE, SPECIAL NUCLEAR AND BYPRODUCT MATERIALS, AS DEFINED IN THE ATOMIC ENERGY ACT OF 1954 (AEA), ARE REGULATED AT THE U.S. DEPARTMENT OF ENERGY (DOE) FACILITIES EXCLUSIVELY BY DOE ACTING PURSUANT TO ITS AEA AUTHORITY. DOE ASSERTS, THAT PURSUANT TO THE AEA, IT HAS SOLE AND EXCLUSIVE RESPONSIBILITY AND AUTHORITY TO REGULATE SOURCE, SPECIAL NUCLEAR, AND BYPRODUCT MATERIAL AT DOE-OWNED NUCLEAR FACILITIES INFORMATION CONTAINED HEREIN ON RADIONUCLIDES IS PROVIDED FOR PROCESS DESCRIPTION PURPOSES ONLY.



DETAIL B

REFERENCE DRAWINGS		
DWG NO	REV	TITLE
24590-WTP-MV-M59T-00001	0	PRESSURE VESSEL TOLERANCES STANDARD DETAILS
24590-WTP-MV-M59T-00007	2	THERMOWELL CONNECTION STANDARD DETAILS
24590-WTP-MV-M59T-00016001	0	VESSEL CONNECTIONS STANDARD DETAILS SHT 1 OF 2
24590-WTP-MV-M59T-00016002	0	VESSEL CONNECTIONS STANDARD DETAILS SHT 2 OF 2
24590-WTP-MV-M59T-00009	0	LIFTING LUG STANDARD DETAILS
24590-WTP-MV-M59T-00010	0	TAILING LUG STANDARD DETAILS
24590-WTP-MV-M59T-00012	0	GROUNDING LUG STANDARD DETAILS
24590-WTP-MV-M59T-00017	0	VESSEL INSPECTION MANWAY STANDARD DETAILS
24590-WTP-MV-M59T-00023	0	ANCHOR BOLT CHAIR DETAIL FOR VERTICAL VESSELS
24590-WTP-SS-S15T-00035	0	CIVIL/STRUCTURAL STD STEEL DETAIL-OSHA PIPE HANDRAIL
24590-WTP-SS-S15T-00036	0	CIVIL/STRUCTURAL STD STEEL DETAIL-OSHA PIPE HANDRAIL
24590-WTP-SS-S15T-00041	0	CIVIL/STRUCTURAL STD STEEL LADDERS, CAGES AND SAFETY GATES
24590-WTP-SS-S15T-00042	0	CIVIL/STRUCTURAL STD STEEL LADDERS, CAGES AND SAFETY GATES
24590-WTP-SS-S15T-00043	0	CIVIL/STRUCTURAL STD STEEL LADDERS, CAGES AND SAFETY GATES
24590-LAW-M6-RLD-P0001	0	LAW RADIOACTIVE LIQUID WASTE DISPOSAL SYSTEM PLANT WASH AND SBS CONDENSATE COLLECTION

REV	DESCRIPTION	ORG	CHKD	RVWD	APVD	DATE
1	ISSUED FOR PERMITTING USE					11/7/03
0	ISSUED FOR PERMITTING USE	JJ	CS		SK	10/28/02

REVISION HISTORY

ISSUED BY RPP-WTP PDC 11/8/03 DATE
ISSUE STAMP

PROJECT No.	24590
SITE	HANFORD
AREA	200E
BUILDING No.	20

	BY	DATE
ORIGINATOR	JESSICA JACKSON	10/22/02
CHECKER	CLIFF SLATER	10/22/02
APPROVER	SUZANNE KIRK	10/28/02
REVIEWER		

CONTENT APPLICABLE TO ALARA? ☐ YES ☐ NO
ADR NO. REV:

RIVER PROTECTION PROJECT
WASTE TREATMENT PLANT
2435 STEVENS CENTER PLACE
RICHLAND, WA 99352

CONTRACT No: DE-AC27-01RV14136

EQUIPMENT ASSEMBLY SBS CONDENSATE COLLECTION VESSEL RLD-VSL-00005

SCALE: NTS

24590-LAW-MV-RLD-P0003 REV 1

'E' SIZE - 44x34
COMPUTER GENERATED - MANUAL CHANGES NOT PERMITTED

11/17/2003 03:04:04 PM

FORM E-SJ9BOH 02/2003

Attachment 51 – Appendix 9.7 Low Activity Waste Building Specifications

Where information regarding treatment, management, and disposal of the radioactive source, byproduct material, and/or special nuclear components of mixed waste (as defined by the Atomic Energy Act of 1954, as amended) has been incorporated into this permit, it is not incorporated for the purpose of regulating the radiation hazards of such components under the authority of this permit and chapter 70.105 RCW. In the event of any conflict between Permit Condition III.10.A. and any statement relating to the regulation of source, special nuclear, and byproduct material contained in portions of the permit application that are incorporated into this permit, Permit Condition III.10.A. will prevail.

Additional appendices will be added to this appendix as new information is incorporated into this permit.

Drawings and Documents

Attachment 51 – Appendix 9.7

Low Activity Waste Building
Specifications

The following drawings have been incorporated into Appendix 9.7 and can be viewed at the Ecology Richland Office. **New drawings are in bold lettering**.

Drawing/Document Number	**Description**
24590-LAW-3PS-PF00-TP001, Rev 0	Engineering Specification for Shop Fabrication of LAW Melter Piping and Components
RESERVED	RESERVED

R10286832

BECHTEL

ISSUED BY RPP-WTP PDC
INIT DATE

RIVER PROTECTION PROJECT – WASTE TREATMENT PLANT

ENGINEERING SPECIFICATION

FOR

Shop Fabrication of LAW Melter Piping and Components

SID SOURANI
STATE OF WASHINGTON
39097
REGISTERED
PROFESSIONAL ENGINEER
EXPIRES: 5/31/2006
P.E. 7/7/04

Content applicable to ALARA? ☐ **Yes** ☒ **No**

ADR No.
N/A

Rev
N/A

NOTE: Contents of this document are Dangerous Waste Permit affecting.

Quality Designator
QL
DOE Contract No. DE-AC27-01RV14136

0	7/7/04	Issued for Permitting Use	DJR			N/A	
REV	**DATE**	**REASON FOR REVISION**	**BY**	**CHECK**	**REVIEW**	**QA**	**APEM/DEM**

SPECIFICATION No.	**Rev**
24590-LAW-3PS-PF00-TP001	0

Notice

Please note that source, special nuclear, and byproduct materials, as defined in the Atomic Energy Act of 1954 (AEA), are regulated at the US Department of Energy (DOE) facilities exclusively by DOE acting pursuant to its AEA authority. DOE asserts that, pursuant to the AEA, it has sole and exclusive responsibility and authority to regulate source, special nuclear, and byproduct materials at DOE-owned nuclear facilities. Information contained herein on radionuclides is provided for process description purposes only.

Contents

Appendices

1 Scope

1.1 Project Description and Location

The River Protection Project – Waste Treatment Plant (RPP-WTP) is a complex of radioactive waste processing facilities that will be designed, engineered and constructed by Bechtel National, Inc. for the Department of Energy (DOE). The facility will pretreat and immobilize the low-activity waste (LAW) and high-level waste (HLW) currently stored in underground storage tanks at the Hanford Site. The facility will convert radioactive waste into solid glass, a process called vitrification. The facility operating design life is 40 years.

The Hanford Site occupies an area of about 560 square miles and the RPP-WTP is located in the 200 East Area of the Hanford site, near Richland, Washington along the Columbia River. The Counties of Benton, Franklin, and Grant surround the Hanford Site.

1.2 Equipment, Material, and Services Required

1.2.1 Fabricate, inspect and test LAW melter piping and components in strict accordance with the requirements, codes, drawings, and specifications contained in and referenced by this document and the associated purchase documents.

1.2.2 Provide necessary labor, tools, and equipment to safely perform the specified work in accordance with the requirements of this specification, design drawings, and the purchase order.

1.2.3 Provide necessary material and components including plate, piping, expansion joints/bellows, couplings, hose, insulation, bolts/studs, gaskets, etc., as specified on the design drawings.

1.2.4 Provide necessary material and components to fabricate and assemble the LAW main and standby offgas pipe lines. This assembly and fabrication work includes, but is not limited to, the following: Nickel alloy pipe rolled from plate, offgas shield wall penetrations, HILTAP couplings, shielded expansion joints, custom flanges, bolts/studs and gaskets, insulation, and relief devices.

1.2.5 Provide necessary material and components to fabricate and assemble the LAW Feed piping encasement and hose assemblies. This assembly and fabrication work includes, but is not limited to, the following: custom fabricated stainless steel encasement with flanges and gasketed covers, seal plate assemblies, hose assemblies, bolts/studs and gaskets.

1.2.6 Perform required inspections and testing of LAW melter offgas piping, hose assemblies, encasements and other components, including Nondestructive Examination (NDE) of weld joints, hydrostatic testing, and leak testing.

1.2.7 Provide Positive Material Identification (PMI) on the LAW offgas piping and components.

1.2.8 Tag LAW melter piping spools and components with identification numbers in accordance with the identification numbers shown on the design drawings or other instructions from the Buyer.

1.3 Work by Others

1.3.1 The Seller is not required to purchase the (2) 10 inch butterfly valves with actuators, or any other item listed as government furnished equipment. See Appendix A.

1.3.2 Installation of the LAW main and standby offgas pipe lines, LAW feed lines, encasement and hose assemblies at the LAW facility will be done by the Buyer.

1.4 Definitions

1.4.1	Buyer	Bechtel National, Inc.
1.4.2	Buyer's Representative	The Buyer's designee(s), who shall witness online operations at the Seller's sites and performs onsite inspections and surveillances.
1.4.3	Seller	Manufacturer, assembler, fabricator, vendor, supplier or equal who provides equipment, systems, components, services, or other products for delivery to the Buyer.
1.4.4	LAW Melter	Low Activity Waste Melter
1.4.5	Vitrification	The process of combining a waste stream with glass formers at high temperature to produce a stable waste form.

1.5 Safety/Quality Classifications

1.5.1 LAW offgas pipe and components: Safety Design Class (SDC) / Quality Level –1 (QL-1)

1.5.2 LAW melter feed encasement and hose: Commercial Material (CM)

2 Applicable Documents

2.1 General

2.1.1 Work shall be done in accordance with the referenced codes, standards, and specifications, listed below, which are an integral part of this specification.

2.1.2 When specific chapters, sections, parts, or paragraphs are listed following a code, industry standard, or reference document, only those chapters, sections, parts, or paragraphs of the document are applicable and shall be applied. If a date or revision is not listed, the latest issue, including addenda, at the time of Request for Quote (RFQ) shall apply. When more than one code, standard, or referenced document covers the same topic, the requirements for all must be met with the most stringent governing.

2.1.3 In the event of a conflict between the requirements of the referenced codes, standards, specifications, regulations and procedures, the Seller shall submit the recommended resolution to the Buyer for review and permission to proceed prior to implementation.

2.2 Codes

2.2.1	ASME B&PV Code, Section V	Nondestructive Examination
2.2.2	ASME B&PV Code, Section IX	Qualification standard for Welding and Brazing procedures, Welders, Brazers, and Welding and Brazing Operators
2.2.3	ASME B31.3–1996	Process Piping
2.2.4	Deleted	
2.2.5	Deleted	
2.2.6	ASTM B366-2001	Standard Specification for Factory - Made wrought Nickel and Nickel Alloy Fittings
2.2.7	ASTM B705-2000	Standard Specification for Nickel-Alloy (UNS N06625, N06219 and N08825) welded pipe.
2.2.8	ASTM B829-1999	Standard Specification for General Requirements for Nickel and Nickel Alloys Seamless Pipe and Tube
2.2.9	AWS QC1	Standard for AWS Certification of Welding Inspectors

2.3 Industry Standards

2.3.1 Pipe Fabrication Institute (PFI) Standards

PFI-ES-3-1981	Fabricating Tolerance
PFI-ES-5-2002	Cleaning of Fabricated Piping
PFI-ES-31-1992	Standard for Protection of Ends of Fabricated Piping Assemblies

2.3.2 American Society of Nondestructive Testing (ASNT)

2.3.2.1 Recommended Practice No. SNT-TC-1A, June 1980 Edition through 2001 Edition, all-inclusive, and its applicable supplements.

2.4 Reference Specifications

2.4.1	24590-WTP-3PS-G000-T0001	General Specification for Supplier Quality Assurance Program Requirements

2.4.2	24590-WTP-3PS-G000-T0003	Engineering Specification for Packaging, Handling, and Storage Requirements
2.4.3	24590-WTP-3PS-G000-TP002	Engineering Specification for Positive Material Identification (PMI)
2.4.4	24590-WTP-3PS-NWP0-T0001	Engineering Specification for General Welding and NDE Requirements for Supplier Fabricated Piping
2.4.5	Deleted	
2.4.6	Deleted	
2.4.7	Deleted	
2.4.8	Deleted	

3 Design Requirements

3.1 Design By Others

3.1.1 The LAW melter piping and component design will be performed by the Buyer and will be depicted on the individual design drawings released to the Seller.

4 Materials

4.1 General

4.1.1 Materials shall be in accordance with the Buyer furnished drawings, the Purchase Order, and specifications, unless written permission to proceed with alternate materials is granted by the Buyer via the Supplier Deviation Disposition Request (SDDR) per the purchase order requirement.

4.1.2 Material traceability is required for Quality Level QL-1 piping and components.

4.1.3 Positive Material Identification shall be required on the LAW offgas piping and components, and shall be done in accordance with Document 24590-WTP-3PS-G000-TP002.

4.1.4 Materials shall be new.

4.2 Restricted Materials

4.2.1 The majority of materials for the LAW melter piping components fabrication are called out on the design drawings. However, the drawings may not list miscellaneous materials used during the work covered by this specification. Such materials may include tape, markers, cutting fluids, cleaning agents, greases, and oils, which may come in contact with LAW melter pipe and other components. Miscellaneous materials shall meet the following requirements: The halogen content shall not exceed 200 ppm. The total sulfur content shall not exceed 400 ppm.

The total of low melting point metals such as lead, zinc, copper, tin, antimony, mercury shall not exceed 1 percent. Of this mercury should not exceed 50 ppm. These low melting metals shall not be intentionally added during the manufacture of the miscellaneous material. Certification shall be available for Buyer inspections.

4.3 Special Requirements

4.3.1 Ten-inch, schedule 80S pipe made from UNS N06625 material is not readily available in machine-made welded or seamless pipe. The design drawings depict a conservative method of fabricating the pipe and elbows from rolled plate for the small quantity required. It is acceptable to substitute 10-inch, schedule 80S pipe manufactured to ASTM B 705 or ASTM B444, from UNS N06625 material. Submit the ASTM number to the Buyer for information, if this option is selected.

4.3.2 Ten-inch, schedule 80S, long radius elbows made from UNS N06625 material, are not readily available in factory-made wrought buttweld fittings. The design drawings depict a conservative method of fabricating the pipe and elbows from rolled plate for the small quantity required. It is acceptable to substitute factory-made wrought buttweld fittings manufactured to ASTM B 366 from UNS N06625 material. Submit the ASTM number to the Buyer for information, if this option is selected.

4.4 Storage of Special Materials

4.4.1 The Seller shall handle and store materials in a locked controlled area to prevent misappropriation, damage, or deterioration of materials. The Seller shall protect tags and other identifying objects on delivered material for establishing identification and traceability. Heat numbers removed by fabrication or cutting shall be transferred to the used and unused material to maintain traceability.

5 Fabrication

5.1 Welds

5.1.1 Piping welds and attachments to piping shall be welded and inspected in accordance with ASME B31.3 – 1996 and document 24590-WTP-3PS-NWP0-T0001, except as listed below. NDE is listed in section 6, "Tests and Inspections".

5.1.1.1 Document 24590-WTP-3PS-NWP0-T0001, paragraph 3.2, does not apply.

5.1.1.1.1 Replace Paragraph 3.2, document 24590-WTP-3PS-NWP0-T0001, with the following: Before any fabrication is to commence, the Seller shall submit to the Buyer a detailed Welding Procedure Application List identifying the Welding Procedures being used. This document shall also identify the extent of NDE along with PMI. This document shall be submitted to the Buyer for review in accordance with the Material Requisition (MR), section 3, Form G-321-E. A review status of "Work May Proceed" shall be obtained prior to use. The Form G-321-E instructions and form provide the time frames required for submittals. Figure 1 in document 24590-WTP-3PS-NWP0-T0001 is a typical example of the Welding Procedure Application List.

5.1.1.2 Backing rings are not permitted.

5.1.2 Deleted

5.1.3 Welder's Qualification -Personnel performing pipe welding shall be qualified in accordance with Section IX of the ASME B&PV Code.

5.1.4 Prepare and submit shop / as-built drawings, including identification of shop welds.

5.2 Assembly

5.2.1 Unless otherwise noted on the design drawings, dimensional tolerances of PFI-ES-3 for fabricated piping assemblies shall not be exceeded.

6 Tests and Inspections

6.1 Personnel Qualifications

6.1.1 Certified Welding Inspector : Seller personnel performing welding inspections shall be Certified Weld Inspectors (CWI), in accordance with the requirements specified in American Welding Society (AWS) QC1. The following documentation shall be submitted prior to the start of welding: current AWS CWI certification, current and valid visual acuity examination for CWI personnel, and weld inspection procedures.

6.1.2 Nondestructive examination (NDE) personnel shall be qualified and certified in accordance with the recommended guidelines of the American Society of Nondestructive Testing (ASNT). Recommended Practice No. SNT-TC-1A. Qualified inspectors shall have at least a level II or level III certification to perform NDE.

6.2 Nondestructive Examinations

6.2.1 The Seller is responsible for all nondestructive examination and testing of piping, components, and hose assemblies furnished under this specification.

6.2.2 Buyer's representative shall be provided free access to the Seller's facilities, to review, to witness, inspect, and report progress of work.

6.2.3 No sub-tier supplier shall perform NDE work without submittal of NDE procedure and Buyer's review/ and approval in accordance with the Material Requisition (MR), section 3, Form G-321-E. All submittals shall be from the Seller to the Buyer (not from the Sellers sub-tier supplier directly to the Buyer).

6.2.4 Perform and evaluate examinations per procedures and acceptance standards prepared in accordance with the applicable Code and/or Standard, and ASME Boiler and Pressure Vessel

Code, Section V. In addition, the specific examination requirements per Appendix B shall be performed.

6.2.5 Deleted

6.3 Shop Tests

6.3.1 Unless otherwise noted on the individual design drawings, all piping and hoses with fluid-containing components shall be hydrostatically tested in accordance with the requirements of ASME B31.3, Chapter VI.

6.3.2 Test pressure shall be 150% of design pressure and adjusted for design temperature per ASTM B31.3 paragraph 345.4.2. Maintain test pressure for a minimum of 10 minutes. Acceptance criterion shall be: *No leaks observed.*

6.3.3 The Seller shall submit a hydrostatic testing procedure for review and approval in accordance with the Material Requisition (MR), Section 3, Form G-321-E. This will be done prior to performing the hydrostatic testing.

6.3.4 The test medium can be distilled water or deionized water, or clean, potable water having less than 100 ppm halides.

6.3.5 LAW Feed Line Encasement Leak Test.

6.3.5.1 Isolate each end of the encasement. Connect temporary fill, drain and vent connections to the encasement assembly. Fill and vent the encasement until completely full. Acceptance criterion: *No leaks observed.*

6.3.6 A test report shall be prepared, certified and submitted to the Buyer for each completed hydrostatic or leak test. The Seller shall also include a record of the accepted testing as part of the pipe spool documentation.

7 Preparation for Shipment

7.1 Cleanliness

7.1.1 Perform cleaning of fabricated piping as outlined in PFI-ES-5. Cleaned piping shall be free of loose rust or mill scale, blisters, grease, sand, oil, dirt, and other foreign materials.

7.1.2 Clean austenitic stainless steel and/or nickel based alloy piping in a protected area that is free from air-borne chloride contamination. Prevent contamination from non-stainless steel particles such as machine chips, grinding dust, weld spatter, and other debris during fabrication by shielding or other suitable means.

7.1.3 Only austenitic stainless steel brushes that have not been previously used on another material may be used on austenitic stainless steel and nickel alloy piping when brushes are applied.

7.1.4 Where solvent is required to remove grease or oil from austenitic stainless steel and/or nickel based alloy piping, acetone or alcohol (ethyl, methyl, or isopropyl) shall be used. Alternatively, a detergent flush may be used in lieu of solvent cleaning with prior permission to proceed from Buyer.

7.1.5 Final cleaning materials in contact with austenitic stainless steel and/or nickel based alloy shall contain less than 200 ppm halogens. If detergent cleaning is used, rinse with potable water having no more than 100 ppm chloride content. After rinsing, the piping shall be drained out completely such that no standing pockets/puddles of water remain that may later concentrate by evaporation. Removal of excess rinse water may be augmented by swabbing, squeegeeing, or air blowing.

7.1.6 After cleaning, blow dry the interior surfaces of all piping.

7.2 Tagging

7.2.1 Tag each spool, pipe, hose and component with a stainless steel tag. Attach the tag with stainless steel wire. The tag shall be engraved or stamped with the identification information. Each tag shall contain: Spool or piece number, MR number, and drawing number.

7.3 Packaging

7.3.1 Packaging, handling and storage shall be in accordance with Document 24590-WTP-3PS-G000-T0003.

7.3.2 Comply with the minimum end protection requirements criteria outlined in PFE-ES-31.

7.3.3 Cover pipe openings with nonmetallic end caps. Seal the edge of the end cap to the pipe exterior with at least 2 passes of sealing tape. Sealing tape containing less than 200 ppm halogens shall be used on stainless steel piping.

7.3.4 Block, strap and separate with dunnage as necessary to prevent damage during shipment.

7.3.5 Place small loose pieces in boxes for protection during shipment. Identify each box with the Material Requisition (MR) number.

7.3.6 The Seller shall take extra precautions to ensure that welded-in valves are protected during shipment.

8 Quality Assurance

8.1 QA requirements specific to item(s) or service

8.1.1 The Seller's Quality Assurance Program (QAP) Requirements are specified in 24590-WTP-3PS-G000-T0001 and detailed in the Supplier Quality Assurance Program Requirements Data Sheet.

8.1.2 The Seller's QAP Manual shall be submitted to Buyer for review in accordance with 24590-WTP-3PS-G000-T0001 and the procurement documents.

8.1.3 Submittal requirements stated in this specification will be specified in the procurement documents.

8.2 Program QA elements

8.2.1 Seller's QAP, as a minimum, shall contain the requirements detailed in the Supplier Quality Assurance Program Requirements Data Sheet(s) listed in Section 2 of the Material Requisition.

9 Configuration Management

9.1 See Section 2 of the Material Requisition for mandatory contents of Seller's QA program.

10 Documentation and Submittals

10.1 General

10.1.1 Documentation and submittals shall be per Material Requisition (MR) Section 3, Forms G-321-E and G-321-V.

Appendix A Government Furnished Equipment

10" Butterfly Valve with Actuator, LOP-YV-1008, 24590-QL-MRP-JV01-00003
10" Butterfly Valve with Actuator, LOP-YV-2008, 24590-QL-MRP-JV01-00003

Appendix B Nondestructive Examination (NDE) of Fabrication Pipe Welds

ASME B31.3 Process Piping (1996)	
Type of Weld	Normal Fluid Service
Girth and Miter Welds	100% VT 5% RT or 5% UT
Longitudinal Welds	100% VT Spot RT
Fillet including Socket, Seal, and Attachment Welds for Branch Reinforcement and Supports	100% VT 100% PT
Branch Connections including Pressure-containing Welds in Branches	100% VT 100% PT

Notes:
1. Acceptance Criteria for Normal Fluid Service, ASME B31.3-96

Legend:
RT – Radiographic Examination
PT – Liquid Penetrant Examination
VT – Visual Examination
UT – Ultrasonic Examination

Attachment 51 – Appendix 9.8
Low Activity Waste Building
Engineering Calculations

Where information regarding treatment, management, and disposal of the radioactive source, byproduct material, and/or special nuclear components of mixed waste (as defined by the Atomic Energy Act of 1954, as amended) has been incorporated into this permit, it is not incorporated for the purpose of regulating the radiation hazards of such components under the authority of this permit and chapter 70.105 RCW. In the event of any conflict between Permit Condition III.10.A. and any statement relating to the regulation of source, special nuclear, and byproduct material contained in portions of the permit application that are incorporated into this permit, Permit Condition III.10.A. will prevail.

Additional appendices will be added to this appendix as new information is incorporated into this permit.

Drawings and Documents

Attachment 51 – Appendix 9.8

Low Activity Waste Building
Engineering Calculations

The following drawings have been incorporated into Appendix 9.8 and can be viewed at the Ecology Richland Office. **New drawings are in bold lettering**.

Drawing/Document Number	**Description**
24590-LAW-PER-M-02-002, Rev 6	Flooding Volume for LAW Facility
RESERVED	RESERVED

BECHTEL

R10680049

Document title: **Flooding Volume for LAW Facility**

Contract number: DE-AC27-01RV14136

Department: Mechanical Systems

Author(s): Robert Hanson

ISSUED BY
RPP-WTP PDC

Principal author signature:

Document number: 24590-LAW-PER-M-02-002, Rev 6

Checked by: Lisa Han

Checker signature:

Date of issue: 5/6/06

Issue status: Issued for Permitting Use

Approved by: Janet Roth

Approver's position: LAW Area Project Engineering Manager

Approver signature:

ERIC B. ISERN
STATE OF WASHINGTON
33449
REGISTERED
PROFESSIONAL ENGINEER
4/20/06
EXPIRES: 07/28/07

This bound document contains a total of 19 sheets

River Protection Project
Waste Treatment Plant
2435 Stevens Center Place
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United States of America
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Notice

Please note that source, special nuclear, and byproduct materials, as defined in the *Atomic Energy Act of 1954* (AEA), are regulated at the US Department of Energy (DOE) facilities exclusively by DOE acting pursuant to its AEA authority. DOE asserts, that pursuant to the AEA, it has sole and exclusive responsibility and authority to regulate source, special nuclear, and byproduct materials at DOE-owned nuclear facilities. Information contained herein on radionuclides is provided for process description purposes only.

History Sheet

Rev	Date	Reason for revision	Revised by
0	7/16/02	Issued for permitting use.	J. Rewari
1	9/20/02	Revised to include +3 ft elevation and Appendix A	J. Rewari
2	12/05/02	Revised Appendix A	J. Rewari
3	3/27/03	Revised Section 3, Appendix A & Issued for permitting use.	J. Rewari
4	3/23/04	Revised to include +28 ft elevation and remove Melter 3 tankage. Issued for permitting use.	J. Rewari
5	02/08/05	Revised to include changes to -21 and +28 ft elevations.	D.F. Miller
6	05/06/06	Revised to correct inconsistencies between text and appendix A	R. Hanson

Contents

Appendices

Figures

1 Introduction

The Washington Administrative Code, WAC 173-303, requires that secondary containment be designed and operated to contain 100 % of the capacity of the largest tank within its boundary for tank systems containing dangerous waste. This report discusses the assessment of flooding volume that is required to be contained for the low-activity waste vitrification (LAW) facility.

2 Applicable Documents

- WAC 173-303. *Dangerous Waste Regulations.* Washington Administrative Code.

3 Description

3.1 Flooding Volume Description for LAW Facility at −21 Ft Elevation

The only vessel in the LAW facility containing dangerous waste at −21 ft elevation is the C3/C5 drains/sump collection vessel (RLD-VSL-00004). In the event of a line break, vessel failure, or tank overflow, flooding could occur in the cell. The C3/C5 drains/sump collection vessel (RLD-VSL-00004) is in an enclosed C3/C5 cell area, in room L-B001B (C3/C5 drain collection cell).

To conservatively calculate the available area of the cell where the flooding volume could leak, the largest cross-sectional area of the vessel is subtracted from the cross-sectional area of the rectangular cell. The required height of the liner is equal to the flooding volume divided by the available cross-sectional area of the room.

In order to calculate the minimum height of C3/C5 drain collection cell (room L-B001B) stainless steel liner, the following 2 scenarios are considered.

a Leakage and spillage of the C3/C5 drains/sump collection vessel (RLD-VSL-00004) when the total volume of fluid contained in the vessel is discharged into the cell. The flooding volume is the larger of 110 % (used as a conservative criteria) of the maximum operating volume of the largest vessel, or 100 % of the total volume of the largest vessel. The vessel total volume is defined as internal volume of the vessel including the shell and both heads. The total vessel volume of 1034 ft^3 is greater than 110 % of the maximum operating volume. Fire sprinklers are provided in this cell; therefore, 246 ft^3 of fire water from 20 minutes of sprinklers in the cell is added to the flooding volume. Thus, 1280 ft^3 is the total volume used for calculating the cell liner height. Minimum liner height required for this case is 3.4 ft.

b The vessel is full and intact so only fire water runoff from higher elevation floor drains is considered for the flooding volume. This scenario is based on the design of the LAW facility systems and uses a conservative volume of water for calculation of the liner height, almost 3 times the volume required in WAC 173-303. As shown in Figure 1, several of the LAW facility floor drains, sumps, and overflow lines drain to the C3/C5 drains/sump collection vessel (RLD-VSL-00004). In the event of a fire, the fire water would collect on the higher elevations and drain to the tank. Since the tank is full and not leaking in this scenario, fire water would flow out of the tank and into the cell via the overflow nozzle. The fire area used in this scenario is the largest design requirement for the LAW facility. Volume of 30 minutes of fire water outside of the cell is calculated to be 21,420 gallons or 2864 ft^3. Minimum liner height required for this case is 9.3 ft.

Based on these scenarios, the cell is lined with stainless steel plates to a minimum height of 9.3 ft. The calculation for the volume of fire water includes a safety factor of 1.4 for conservatism and to compensate for construction tolerances. The largest cross-sectional area of the vessel is used to conservatively calculate the cross-sectional area of the rectangular cell, even though the cross-sectional area of the vessel at the bottom is much smaller. Additionally, the actual liner height will be rounded up to the next half-foot.

3.2 Flooding Volume Description for LAW Facility at +3 Ft Elevation

LAW facility has the following vessels, containing dangerous waste, in the process cells, and effluent cell rooms, at +3 ft elevation:

Process Cell Room L-0123

LCP-VSL-00001	melter 1 concentrate receipt vessel
LFP-VSL-00001	melter 1 feed preparation vessel
LFP-VSL-00002	melter 1 feed vessel
LOP-VSL-00001	melter 1 submerged bed scrubber (SBS) condensate vessel
LOP-WESP-00001	melter 1 wet electrostatic precipitator (WESP)
LOP-SCB-00001	melter 1 SBS

Process Cell Room L-0124

LCP-VSL-00002	melter 2 concentrate receipt vessel
LFP-VSL-00003	melter 2 feed preparation vessel
LFP-VSL-00004	melter 2 feed vessel
LOP-VSL-00002	melter 2 SBS condensate vessel
LOP-WESP-00002	melter 2 WESP
LOP-SCB-00002	melter 2 SBS

Effluent Cell Room L-0126

RLD-VSL-00003	plant wash vessel
RLD-VSL-00005	SBS condensate collection vessel

3.2.1 Process Cells

The process cells have 6 vessels in each cell. Both process cells are identical in size and contain a similar set of vessels.

For calculating the minimum height of stainless steel liners for process cell rooms L-0123, and L-0124, the following scenario is considered:

The total volume of fluid contained in the largest vessel is discharged by leakage or spillage into the cell.

To conservatively calculate the available area of the cell where the flooding volume could leak, the largest cross-sectional area of each of the vessels are subtracted from the cross-sectional area of the rectangular cell. The required height of the liner is equal to the flooding volume divided by the available cross-sectional area of the room.

The liners are sized to hold 100 % of the total volume of the largest vessel or 110 % of its maximum operating volume, whichever is greater. In all cases, the total volume is used because this is larger than 110 % of the volume up to the overflow nozzle.

The largest vessel in each cell is the concentrate receipt vessel, (LCP-VSL-00001, -00002), and the total volume for each is 2428 ft^3. This is the volume used for calculating the process cell room (L-0123 and L-0124) liner height. The available cross-sectional area of the room into which the liquid could flow is calculated to be 1279 ft^2. The liner height is calculated by dividing the volume of the largest vessel (2428 ft^3) by the available area of the room (1279 ft^2).

The minimum liner height required for each process cell is 1.9 ft. Conservative values for the vessel volume are used in the calculation of the liner height by using the volume of the vessel without subtracting the volume of the internal equipment. The largest cross-sectional area of the vessel is used to conservatively calculate the cross-sectional area of the rectangular cell, even though the cross-sectional area of the vessel at the bottom is much smaller. Additionally, the actual liner height will be rounded up to the next half-foot.

3.2.2 Effluent Cell

Effluent cell room L-0126 has 2 vessels in it. Both vessels are identical in size. Using the same method as for the process cells, the total volume of each of these vessels is 3445 ft^3. The available cross-sectional area of the room into which the liquid could flow was calculated to be 799 ft^2. The liner height is calculated by dividing the volume of the largest vessel (3445 ft^3) by the available area of the room (799 ft^2).

The minimum liner height required for effluent cells is 4.4 ft. Conservative values for the vessel volume are used in the calculation of the liner height by using the volume of the vessel without subtracting the volume of the internal equipment. The largest cross-sectional area of the vessel is used to conservatively calculate the cross-sectional area of the rectangular cell, even though the cross-sectional area of the vessel at the bottom is much smaller. Additionally, the actual liner height will be rounded up to the next half-foot.

3.3 Flooding Volume Description for LAW Facility at +28 Ft Elevation

LAW facility has the following tank, containing dangerous waste, at +28 ft elevation:

Caustic Scrubber Blowdown Pump Room, Room L-0218

LVP-TK-00001 caustic collection tank

3.3.1 Room L-0218

Caustic Scrubber Blowdown Pump Room, Room L-0218, at elevation +28 contains the caustic collection tank (LVP-TK-00001). The tank sets on a 6" high octagonal pedestal. Also located in this room are 4 pumps on individual pedestals. The room's concrete walls with special protective coating are provided to contain liquid in case of leakage. For simplicity, these walls will be referred to as the "secondary containment".

For calculating the minimum height of the secondary containment walls, the following scenario is considered:

The total volume of the fluid contained in the tank is discharged by leakage or spillage in to the secondary containment. In addition to this, if there is a fire in the area during this event, the automatic fire protection sprinkler system will activate and add fire protection water to the fluid discharged from the tank. Therefore, the secondary containment wall is sized to handle the volume of the fire protection water from the sprinkler system over the design area for a period of 20 minutes in addition to the 100% capacity of the tank.

To calculate the minimum secondary containment wall height, the available volume of the room and the volume of fire water must also be calculated; altogether, the calculation is done in four steps.

Step 1: Calculate the volume of available secondary containment up to 6". This step excludes the 6" tank pedestal and the 4-6" pump pedestals from the available area.

Step 2: Calculate the volume of available secondary containment from 6" to 2'- 5 1/4". This excludes the area above the 4 pump pedestals to the height of the pump discharge. This area is conservatively considered unavailable for the pumps themselves.

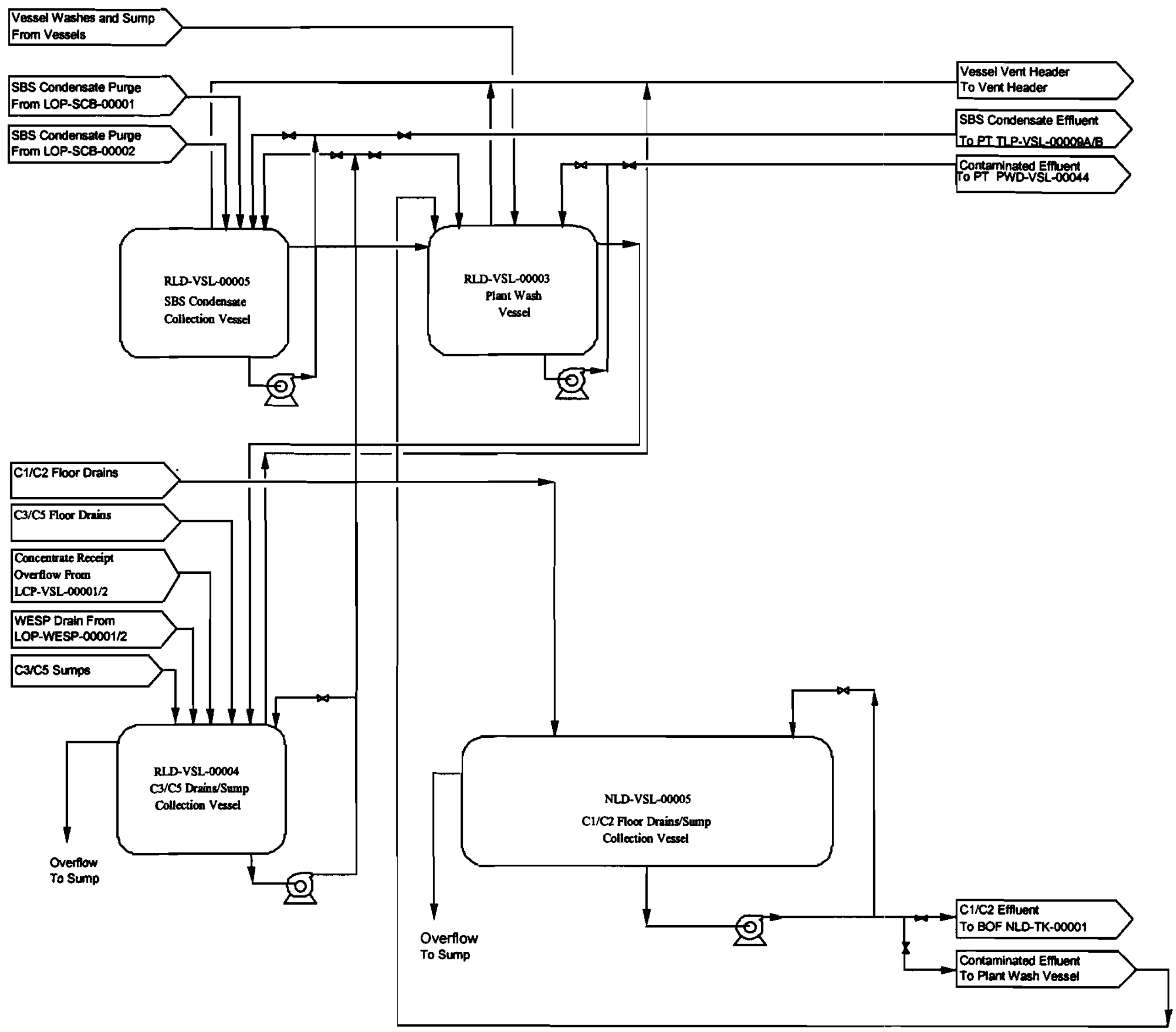
Step 3: Calculate the additional height of the secondary containment wall (above the first 2' - 5 1/4") required to accommodate the remaining total tank volume: (Volume of the tank minus the volume calculated in Steps 1 and 2) divided by the area of the room.

Step 4: Calculate the volume of 20 minutes of fire water from the sprinkler system, multiplied by a safety factor of 1.4. Calculate the height of the secondary containment wall for fire water by dividing the volume of fire water by the area of the room.

The secondary containment wall height required is then: 2' - 5 1/4" (Steps 1 and 2) plus additional height of the wall (Step 3) plus height required for fire water (Step 4).

The minimum secondary containment wall height required for this room is 4 ft.

Figure 1 LAW Effluent General Flow Diagram



Appendix A

Calculation of Volume and Liner Height

Appendix A: Calculation of Volume and Liner Height

1 Purpose

The purpose of this calculation is to size the height of the liners in the process cells for LAW vitrification facility at elevation −21 ft and elevation +3 ft. C3/C5 drains/sump collection vessel (RLD-VSL-00004) room L-B001B is shown at elevation −21 ft on drawing 24590-LAW-P1-P01T-P0001 (*LAW Vitrification Building General Arrangement Plan at El. −21' 0"*). Process cell rooms L-0123 and L-0124 and effluent cell room L-0126 on elevation +3 ft are shown on drawing 24590-LAW-P1-P01T-P0002 (*LAW Vitrification Building General Arrangement Plan At El 3' 0"*).

Additionally, this calculation will size the height of the secondary containment with protective coating required for the caustic scrubber blowdown pump room, Room L-0218 on elevation +28. This room is shown on drawing 24590-LAW-P1-P01T-P0004 (*LAW Vitrification Building General Arrangement Plan At El 28' 0"*).

2 Criteria and Design Input

2.1 Process and Effluent Cell Liner Height

To provide the worst case scenario, the vessels are conservatively assumed to be completely filled (including the top head) and sitting on the floor, and that the largest vessel total volume is used as the volume in determining the liner height. To allow for the worst case scenario, the volume of the vessel is assumed to leak completely onto the floor.

The liners are sized to hold 100 % of the total volume of the largest tank or 110 % of its maximum operating volume, whichever is larger. In all cases, the total volume is used because this is larger than 110 % of the volume up to the overflow nozzle.

In the case of C3/C5 drain collection cell (room L-B001B, El. (-) 21), 2 scenarios are considered: namely, leakage and spillage of the C3/C5 drains/sump collection vessel (RLD-VSL-00004), and collection of fire water from higher elevation floor drains when the vessel is full.

In the case of the process cells and the effluent cells, the largest vessel total volume is used as the volume in determining the liner height.

The following vessels are contained within the process and effluent cells.

LCP-VSL-00001	melter 1 concentrate receipt vessel	Room L-0123	El. +3'
LCP-VSL-00002	melter 2 concentrate receipt vessel	Room L-0124	El. +3'
LFP-VSL-00001	melter 1 feed preparation vessel	Room L-0123	El. +3'
LFP-VSL-00002	melter 1 feed vessel	Room L-0123	El. +3'
LFP-VSL-00003	melter 2 feed preparation vessel	Room L-0124	El. +3'
LFP-VSL-00004	melter 2 feed vessel	Room L-0124	El. +3'

RLD-VSL-00003	plant wash vessel	Room L-0126	El. +3'
RLD-VSL-00005	SBS condensate collection vessel	Room L-0126	El. +3'
LOP-VSL-00001	melter 1 SBS condensate vessel	Room L-0123	El. +3'
LOP-SCB-00001	melter 1 SBS vessel	Room L-0123	El. +3'
LOP-VSL-00002	melter 2 SBS condensate vessel	Room L-0124	El. +3'
LOP-SCB-00002	melter 2 SBS vessel	Room L-0122	El. +3'
LOP-WESP-00001	melter 1 WESP	Room L-0123	El. +3'
LOP-WESP-00002	melter 2 WESP	Room L-0124	El. +3'

Location and size of the C3/C5 drain collection cell (room L-B001B) is based on drawing 24590-LAW-P1-P01T-P0001 (*LAW Vitrification Building General Arrangement Plan at El. −21' 0"*). Location and size of process rooms L-0123, and L-0124 and effluent room L-0126, at elevation 3 ft are shown on drawing 24590-LAW-P1-P01T-P0002 (*LAW Vitrification Building General Arrangement Plan at El. 3' 0"*).

For the C3/C5 drain collection cell (room L-B001B), the fire protection system fire water runoff from higher elevation floor drains has been calculated on the basis of 3000 ft^2 of fire area. The density of the fire water spray is 0.17 gal/min/ft^2 , for 30 minutes and multiplied by a safety factor of 1.4.

2.2 Secondary Containment Wall Height

The caustic collection tank (LVP-TK-00001) is located in the caustic scrubber blowdown tank room L-0218 at elevation +28'-0". The containment wall is sized to handle the volume of fire-protection water from the fire protection system over the design area for a period of 20 minutes in addition to the 100% capacity (or total volume) of the tank. The fire protection water automatic sprinkler design density is 0.17 gpm/sq. ft. Location and size of room L-0218 at elevation +28 ft is shown on drawing 24590-LAW-P1-P01T-P0004 (*LAW Vitrification Building General Arrangement Plan at El. 28' 0"*).

3 Assumptions

None.

4 Methodology

As stated above in the criteria and design input section, to calculate for worst case, the calculation methodology assumes that the vessels are completely filled and sitting on the floor and that the largest tank leaks completely into the room. For the C3/C5 drain collection cell (room L-B001B), the maximum leakage volume to the cell is fire water input from higher elevation floor drains to a filled C3/C5 drains/sump collection vessel (RLD-VSL-00004).

4.1 Basic Equations

$\pi = 3.14$

Area of a Rectangle = Length x Width

Area of Circle $= \pi \frac{D_i^2}{4}$

Volume of Cylinder $= \frac{\pi}{4} \cdot D_i^2 \cdot h$

Volume of Rectangular Room = Length x Width x Height

Area of a Regular Polygon = 1/2 x a x p (where a = apothem and p = perimeter)

Volume of Firewater = Area of Room x fire water spray density x 20 minutes x 1.4 safety factor

4.2 Room Dimension Equations and Symbology

L = length of room (ft)

W = width of room (ft)

H = height of room (ft)

A = area of room (ft^2)

4.3 Volume Calculation

Volume of a vessel or tank is calculated by using the following equations:

$$V_s = \frac{\pi * D_i^2}{4} * L_{T-T}$$

where:

V_s = volume of the cylindrical portion of the vessel or tank

D_i = inside diameter

L_{T-T} = tangent to tangent length

Volume (V_h) of 1 F&D (flanged and dished) head is calculated using the following equation:

$$V_h = 0.0847 * D_i^3$$

$$d = 0.162 * D_i$$

d is the depth of the F&D head

Refer to *Pressure Vessel Design Manual* (Moss, 1987).

Volume (V_c) of conical head is calculated using the following equation:

$$V_c = (1/3)*\{(\pi/4)*(D_i)^2\}*d$$

d is the height of the conical head

The total volume of the vessel or tank = volume of the cylindrical portion + volume of top head + volume of bottom.

4.4 Available Area for Liquid Containment

a) For Cells:

To calculate the possible area that the liquid in the vessel could leak into, the sum of the cross sectional areas of the vessels is subtracted from the cross sectional area of the room.

Area available = area of the room minus sum of the cross sectional areas of the vessels (ft^2)

The height of liner is equal to the volume of the largest vessel divided by the available area of room. This excludes the cross sectional area of the leaking vessel.

Height of the liner (ft) = volume of the largest vessel / area available

b) For Room L-0218:

Room L-0218 contains 4 pumps and 1 tank. To calculate the possible area that the liquid could leak into, the available volume of the room and the volume of the firewater must be calculated. This is done in four steps, calculating available volume by height.

1. Available volume up to 6" excluding pump and tank pedestals.
2. Available volume from 6" to 2'- 5 1/4" excluding area above pump pedestals to the height of the pump discharge.
3. Calculate additional height required to accommodate the remaining total tank volume. Volume of the tank minus the volume calculated in steps 1 and 2 divided by the area of room.
4. Calculate the volume of 20 minutes of firewater from the sprinklers multiplied by safety factor of 1.4. Calculate the height of the containment wall for fire water by dividing the volume of firewater by the area of the room.

The secondary containment wall height required is then: 2' - 5 1/4" (Steps 1 and 2) plus additional height of the wall (Step 3) plus height required for fire water (Step 4).

5 Calculations

Complete calculations for the liner height are as follows for each individual cell:

5.1 C3/C5 Drain Collection Cell, Room L-B001B, Elevation −21 ft

Vessel Number	Diameter (D_i) ft	$L_{T\text{-}T}$ ft	Head Type (Flange and Dished)	Total Height (including bottom and top head) ft	Remark
RLD-VSL-00004	10	11	F&D (bottom and top)	14.24	

Volume of RLD-VSL-00004 = volume of cylindrical portion + volume of heads = 1034 ft^3

Two scenarios are considered:

a Collection of fire water runoff when the vessel is full and intact with a safety factor of 1.4

b Leakage and spillage of the C3/C5 drains/sump collection vessel RLD-VSL-00004

5.1.1 Calculations

A Volume of fire water runoff from higher elevation floor drains will flow into the vessel, and if the vessel is already full, water will overflow into the room (L-B001B). The calculation for the liner height is based on the 3000 ft^2 of fire area with 0.17 gal/min/ft^2 of fire water spray density for 30 minutes multiplied by a safety factor of 1.4.

Volume of fire water = 3000 $ft^2 \times 0.17$ gal/min/$ft^2 \times 30$ minutes $\times 1.4 = 21{,}420$ gallons = 2864 ft^3
Area of the room available = $(16.58 \times 23.33) - \pi/4 \times (10)^2 = 309$ ft^2
Liner height required = 2864/309= 9.3 ft

B If only the vessel fails (including 20 minutes of fire water from the in cell sprinkler system, multiplied by a safety factor of 1.4), and there is no fire water runoff from higher elevation floor drains, then the liner height is calculated as follows: (total area of the cell, including vessel cross-sectional area is used)

Total volume of vessel RLD-VSL-00004 (using formula given in 4.32 above)
= Volume of the cylindrical portion + volume of top head + volume of bottom
$= [\pi/4 \times (10)^2 \times 11] + [0.0847 \times (10)^3] + [0.0847 \times (10)^3]$
= 863.94 + 84.7 + 84.7 = 1033.34, rounded to 1034 ft^3
Area of the room = $(16.58 \times 23.33) = 387$ ft^2
Volume of fire water from in cell sprinkler system
= Area of room x fire water spray density x 20 minutes x 1.4 safety factor
= 387 ft^2 x 0.17 gal/min/ft^2 x 20 min x 1.4 = 1842 gal = 246 ft^3
Liner height required = (1034 + 246)/387 = 3.31 ft, rounded up to 3.4 ft

Thus, based on the calculation in section A, the minimum required liner height is 9.3 ft.

5.2 Melter 1 and 2 Process Cells, Rooms L-0123 and L-0124, Elevation +3 ft

The dimensions of these vessels are as follows:

Room Number	Vessel Number	Diameter (D_i) ft	L_{T-T} ft	Head Type	Total Height (including bottom and top head) ft	Remark
L-0123	LCP-VSL-00001	14	12.75	F&D (bottom and top)	17.29	Largest vessel in the room
	LFP-VSL-00001	11	10.46	F&D (bottom and top)	14.02	
	LFP-VSL-00002	11	10.46	F&D (bottom and top)	14.02	
	LOP-VSL-00001	12	8.12	F&D (bottom and top)	12	
	LOP-WESP-00001	7	17	F&D (bottom and top)	19	
	LOP-SCB-00001	10	6.5	F&D (bottom and top)	9.74	
L-0124	LCP-VSL-00002	14	12.75	F&D (bottom and top)	17.29	Largest vessel in the room
	LFP-VSL-00003	11	10.46	F&D (bottom and top)	14.02	
	LFP-VSL-00004	11	10.46	F&D (bottom and top)	14.02	
	LOP-VSL-00002	12	8.12	F&D (bottom and top)	12	
	LOP-WESP-00002	7	17	F&D (bottom and top)	19	
	LOP-SCB-00002	10	6.5	F&D (bottom and top)	9.74	
	*					

Volume of largest vessel from table above = volume of cylindrical portion + volume of heads
$= [\pi/4 \times (14)^2 \times 12.75] + [0.0847 \times (14)^3] + [0.0847 \times (14)^3]$
$= 1962.71 + 232.41 + 232.41 = 2428\ ft^3$

Area of the room available = $(38.33 \times 48.33) - [\pi/4 \times \{(7)^2 + (11)^2 + (12)^2 + (10)^2 + (11)^2 + (14)^2\}]$
$= 1279\ ft^2$
(Area of the leaking vessel was also subtracted for conservatism.)

Liner height required = 2428/1279 = 1.9 ft

* Melter 3 room and tankage deleted from table.

5.3 Effluent Cell Calculations, Room L-0126, Elevation +3

Room Number	Vessel Number	Diameter (D_i) ft	L_{T-T} ft	Head Type	Total Height (including bottom and top head) ft	Remark
L-0126	RLD-VSL-00003	16	14.66	Flat top and F&D bottom	18	Both vessels in this room

	RLD-VSL-00005	16	14.66	Flat top and F&D bottom	18	

Volume of the largest vessel from above table
= volume of the plant wash/SBS condensate collection vessel (RLD-VSL-00003/RLD-VSL-00005)
= volume of cylindrical portion + volume of F&D bottom + volume of flat head (cylindrical) portion
$= [\pi/4 \times (16)^2 \times 14.66] + [0.0847 \times (16)^3] + [\pi/4 \times (16)^2 \times \{18 - 14.66 - (0.162 \times 16)\}]$
$= 2947.57 + 346.93 + 150.39$
$= 3445\ ft^3$

Area of the room available $= (38.33 \times 31.33) - [\pi/4 \times \{(16)^2 + (16)^2\}] = 799\ ft^2$
(Area of the leaking vessel was also subtracted for conservatism.)

Liner height required = 3445 / 799 = 4.32 ft, round up to 4.4 ft

5.4 Caustic Scrubber Blowdown Pump Room, Room L-0218, Elevation + 28

Room Number	Tank Number	Diameter (D_i) ft	L_{T-T} ft	Head Type	Total Height (including top head) ft	Remark
L-0218	LVP-TK-00001	13	14.32	Flat bottom and conical top with 1: 6 slope	15.41	**d = height of conical head portion** $d = (D_i/2) \times (1/6)$ (due to 1:6 slope)

Volume of the tank from above table
= Volume of the caustic collection tank (LVP-TK-00001)
= Volume of cylindrical portion + volume of conical head portion
$= [\pi/4 \times (13)^2 \times 14.32] + [1/3 \times \pi/4 \times (13)^2 \times \{1.08\}]$
$= 1899.76 + 47.76$
$= 1948\ ft^3$

Dimensions of the pump pedestals, 4 each, are as follows:
5.0 ft by 1.83 ft

Step 1: The secondary containment area has a 0.5 ft high octagonal pedestal for the tank and the distance between the parallel sides of the pedestal is 15 ft. Each side of this octagonal pedestal is 6.21 ft.

Using the equation for a regular polygon:
The area of the tank pedestal is $= 1/2 \times 7.5 \times 8 \times 6.21 = 186\ ft^2$

The area of Room L-0218 can be calculated by dividing the room into three rectangles. Refer to the general arrangement drawing for elevation +28 (see References).

The area of the room available for secondary containment up to 0.5 ft height is

= {Area of the room} – {cross sectional area of pump pedestals} – {cross sectional area of the tank pedestal)
= {(9.19 × 21.25) + (15.25 × 22.33) + (5.35 × 19.25)} – {4(5 × 1.83)} – {186.42}
= {(195.29) + (340.53) + (102.99)} – {36.60} – {186.42}
= 638.81 – 36.60– 186.42 = 415.79 ft^2
Volume of liquid contained by 6" high containment wall = 415.79 × 0.5 = 207.90 ft^3

Step 2: Calculate the volume of available secondary containment from 6" to 2'- 5 1/4" (the height of the pump discharge). This excludes the area above the 4 pump pedestals to the height of the pump discharge.

= {(Area of Room) - (Cross sectional area of pump pedestals)} × {height of containment wall}
= {(638.81) – (36.60)} × {1.94}
= 1168.29 ft^3

Total volume of liquid contained by 2' - 5 1/4" high containment wall = 207.90 + 1168.29 = 1376.19 ft^3

Step 3: The height of wall required to accommodate the remaining total tank volume (above the first 2' - 5 1/4"):
= {(Volume of the Tank) – (1376.19)} / {Area of the room}
={(1949.97) – (1376.19)} / {638.81}
= 573.78 / 638.81 = 0.9 ft.

Step 4: If there is fire in the area during this event and the fire water sprinklers activate, the volume of water added to the secondary containment will be based on the fire water spray density of 0.17 gal/min/ft^2 for 20 minutes multiplied by a safety factor of 1.4.

Volume of fire water = Area of containment in ft^2 × 0.17 gal/min/ft^2 × 20 minutes × 1.4
= 638.81 ft^2 × 0.17 gal/min/ ft^2 × 20 minutes × 1.4
=3040.74 gallons = 406.49 ft^3

Therefore, additional height of containment wall required to accommodate firewater volume
= Volume of firewater / {Area of the room}
= 406.49 / 638.81 = 0.64 ft

Therefore containment wall height required = 2.44 + 0.9 + 0.64 = 3.98 rounded off to 4 ft.

6 Summary

The minimum required liner heights using the method above for the rooms are as follows:

Table of Liner Height			
Cell	Room Number	Minimum Liner Height	Liner Height Rounded Up to Nearest Half Foot
C3/C5 Drain Collection Cell	L-B001B	9.3 ft	9.5 ft
M1 Process Cell	L-0123	1.9 ft	2.0 ft
M2 Process Cell	L-0124	1.9 ft	2.0 ft
Effluent Cell	L-0126	4.4 ft	4.5 ft

Table of Secondary containment Wall Height with Special Protective Coating			
Room	Room Number	Minimum Wall Height	Wall Height Rounded Up to Nearest Half Foot
Caustic Scrubber Blowdown Pump Room	L-0218	3.98 ft	4 ft

7 References

24590-LAW-P1-P01T-P0001, *LAW Vitrification Building General Arrangement Plan at El. −21'0"* Rev. 2

24590-LAW-P1-P01T-P0002, *LAW Vitrification Building General Arrangement Plan at El. 3'0"* Rev. 3

24590-LAW-P1-P01T-P0004, *LAW Vitrification Building General Arrangement Plan at El. 28'0"* Rev. 1

Moss, Dennis R. 1987. *Pressure Vessel Design Manual*, Gulf Publishing Co.

Attachment 51 – Appendix 9.9
Low Activity Waste Building
Material Selection Documentation

Where information regarding treatment, management, and disposal of the radioactive source, byproduct material, and/or special nuclear components of mixed waste (as defined by the Atomic Energy Act of 1954, as amended) has been incorporated into this permit, it is not incorporated for the purpose of regulating the radiation hazards of such components under the authority of this permit and chapter 70.105 RCW. In the event of any conflict between Permit Condition III.10.A. and any statement relating to the regulation of source, special nuclear, and byproduct material contained in portions of the permit application that are incorporated into this permit, Permit Condition III.10.A. will prevail.

Additional appendices will be added to this appendix as new information is incorporated into this permit.

Drawings and Documents

Attachment 51 – Appendix 9.9

Low Activity Waste Building
Material Selection Documentation

The following drawings have been incorporated into Appendix 9.9 and can be viewed at the Ecology Richland Office. See Appendix 7.9 for material selection documentation common to the Pretreatment, LAW, HLW, and Laboratory buildings. **New drawings are in bold lettering.**

Drawing/Document Number	**Description**
24590-LAW-N1D-LCP-P0001, Rev 1	Material Selection Data Sheet for LCP-VSL-00001/2
24590-LAW-N1D-LFP-P0004, Rev 0	Material Selection Data Sheet for LFP-VSL-00001/2/3/4
24590-LAW-N1D-LOP-P0001, Rev 1	Material Selection Data Sheet for LOP-SCB-00001/2
24590-LAW-N1D-LOP-P0002, Rev 1	Material Selection Data Sheet for LOP-VSL-00001/2/3
24590-LAW-N1D-LOP-P0003, Rev 0	Material Selection Data Sheet for LOP-WESP-00001/2
24590-LAW-N1D-LOP-P0004, Rev 0	Material Selection Data Sheet: LOP Offgas piping (downstream of film cooler to SBS entry)
24590-LAW-N1D-LVP-P0002, Rev 0	Material Selection Data Sheet for LVP-TK-00001
24590-LAW-N1D-RLD-P0001, Rev 1	Material Selection Data Sheet for RLD-VSL-00004
24590-LAW-N1D-RLD-P0002, Rev 0	Material Selection Data Sheet for RLD-VSL-00005
24590-LAW-N1D-RLD-P0005, Rev 0	Material Selection Data Sheet for RLD-VSL-00003
RESERVED	RESERVED

PLANT ITEM MATERIAL SELECTION DATA SHEET

R10668000

LCP-VSL-00001 & LCP-VSL-00002 (LAW)
LAW Concentrate Receipt Vessel

- Design Temperature (°F)(max/min): 150/40
- Design Pressure (psig) (max/min): 15/FV
- Location: process cell

Offspring items

LCP-AGT-00001 -- LCP-AGT-00002

ISSUED BY
RPP-WTP PDC

Contents of this document are Dangerous Waste Permit affecting

Operating conditions are as stated on attached Process Corrosion Data Sheet

Cannot be maintained during the 40 year design life.

Options Considered:

- The vessel is filled with waste at up to 122°F.
- The vessel will be washed with process water or caustic.

Materials Considered:

Material (UNS No.)	Relative Cost	Acceptable Material	Unacceptable Material
Carbon Steel	0.23		X
304L (S30403)	1.00		X
316L (S31603)	1.18	X	
6% Mo (N08367/N08926)	7.64	X	
Alloy 22 (N06022)	11.4	X	
Ti-2 (R50400)	10.1		X

Recommended Material: 316 (max 0.030% C; dual certified)

Recommended Corrosion Allowance: 0.040 inch (includes 0.024 inch corrosion allowance and 0.016 inch general erosion allowance)

Process & Operations Limitations:

- Develop rinsing/flushing procedure for acid and water.
- Develop lay-up strategy.

STEVEN WAKEMAN VAIL
STATE OF WASHINGTON
39250
REGISTERED PROFESSIONAL ENGINEER
3/14/06
EXPIRES: 12/07/07

Please note that source, special nuclear and byproduct materials, as defined in the Atomic Energy Act of 1954 (AEA), are regulated at the U.S. Department of Energy (DOE) facilities exclusively by DOE acting pursuant to its AEA authority. DOE asserts, that pursuant to the AEA, it has sole and exclusive responsibility and authority to regulate source, special nuclear, and byproduct materials at DOE-owned nuclear facilities. Information contained herein on radionuclides is provided for process description purposes only.

This bound document contains a total of 6 sheets.

1	3/14/06	Issued for Permitting Use	[signature]	HMK	[signature]
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REV	DATE	REASON FOR REVISION	PREPARER	CHECKER	APPROVER

PLANT ITEM MATERIAL SELECTION DATA SHEET

Corrosion Considerations:

Vessels receive waste for melter feed. Operating temperature range is 77 to 150°F, with a nominal operating temperature of 122°F, and operating pH range is 11 to 14.5. Spray nozzles are present to spray inside of vessel with demineralized water. NaOH is also available to the spray nozzles. Vessels have mechanical agitators and internal transfer pumps.

a General Corrosion

Hamner (1981) lists a corrosion rate for 304 (and 304L) in NaOH of less than 20 mpy (500 µm/y) at 77°F and over 20 mpy at 122°F. He also states 316 (and 316L) has a rate of less than 2 mpy in 50% NaOH at temperatures up to 122°F. Dillon (2000) and Sedriks (1996) both state that the 300 series stainless steels are acceptable in up to 50% NaOH at temperatures up to about 122°F or slightly above. The corrosion rate for 304L in pure NaOH is expected to be less than about 1 mpy up to about 212°F though Sedriks states the data beyond about 122°F are incorrect due to the presence of oxidizing agents.

In this system, the normal pH, nitrate concentrations and temperatures are such that 304L and 316L stainless steels will be acceptable.

Conclusion:

304L or 316L is expected to be sufficiently resistant to the waste solution with a probable general corrosion rate of less than 1 mpy.

b Pitting Corrosion

Chloride is known to cause pitting of stainless steels and related alloys in acid and neutral solutions. Dillon (2000) is of the opinion that in alkaline solutions, pH>12, chlorides are likely to promote pitting only in tight crevices such as might form after partial removal of deposits during multiple rinse cycles. Dillon and Koch (1995) are both of the opinion that fluoride will have little effect in an alkaline media.

The nominal operating temperature for these vessels is 122 °F. At this temperature, 304L or 316L stainless steels would be acceptable in the proposed alkaline-nitrate waste.

If the vessel were filled with process water and left stagnant, there would be a tendency to pit. The time to initiate would depend on the source of the water, being shorter for filtered river water and longer for DIW. Pitting has been observed in both cases, probably because residual chlorides are likely to remain.

Conclusion:

Localized corrosion, such as pitting, is common but can be mitigated, if caused by chlorides, using alloys with higher nickel and molybdenum contents. Based on the expected operating conditions, 316L is expected to be satisfactory.

c End Grain Corrosion

End grain corrosion only occurs in metal with exposed end grains and in highly oxidizing acid conditions.

Conclusion:

Not applicable to this system.

d Stress Corrosion Cracking

The exact amount of chloride required to cause stress corrosion cracking is unknown. In part this is because the amount varies with temperature, metal sensitization, the environment and also because chloride tends to concentrate under heat transfer conditions, by evaporation, and electrochemically during a corrosion process. Hence, even as little as 10 ppm can lead to cracking under some conditions. Generally, as seen in Sedriks (1996) and Davis (1987), chloride stress corrosion cracking does not usually occur below about 140 °F. With the proposed temperatures, 316L is recommended.

Conclusion:

At the normal operating conditions, 316L stainless is the minimum recommended.

e Crevice Corrosion

See Pitting.

Conclusion:

See Pitting.

f Corrosion at Welds

Corrosion at welds is not considered a problem in the proposed environment.

Conclusion:

Weld corrosion is not considered a problem for this system under normal operating conditions.

PLANT ITEM MATERIAL SELECTION DATA SHEET

g Microbiologically Induced Corrosion (MIC)
The normal operating conditions are not conducive to microbial growth.

Conclusion:
Not a concern.

h Fatigue/Corrosion Fatigue
Corrosion fatigue does not appear to be a concern.

Conclusions
Not expected to be a concern.

i Vapor Phase Corrosion
Vapor phase corrosion will be a function of the degree of agitation, solution chemistry, and temperature. Under the stated conditions, and with the presence of wash rings in the vessel, vapor phase corrosion does not appear to be a concern.

Conclusion:
Not expected to be a concern.

j Erosion
Velocities within the vessel are expected to be small. Based on 24590-WTP-RPT-M-04-0008, a general erosion allowance of 0.016 inch is adequate for components with solids content less than 27.3 wt%.

Conclusion:
Not expected to be a concern.

k Galling of Moving Surfaces
Not applicable.

Conclusion:
Not applicable.

l Fretting/Wear
No contacting surfaces expected.

Conclusion:
Not applicable.

m Galvanic Corrosion
No significantly dissimilar metals are present.

Conclusion:
Not expected to be a concern.

n Cavitation
None expected.

Conclusion:
Not believed to be of concern.

o Creep
The temperatures are too low to be a concern.

Conclusion:
Not applicable.

p Inadvertent Nitric Acid Addition
At this time, the design does not provide for the presence of nitric acid reagent in this system.

Conclusion:
Not applicable.

PLANT ITEM MATERIAL SELECTION DATA SHEET

References:

1. 24590-WTP-RPT-M-04-0008, Rev. 2, *Evaluation Of Stainless Steel Wear Rates In WTP Waste Streams At Low Velocities*
2. 24590-WTP-RPT-PR-04-0001, Rev. B, *WTP Process Corrosion Data*
3. Davis, JR (Ed), 1987, *Corrosion, Vol 13*, In "Metals Handbook", ASM International, Metals Park, OH 44073
4. Dillon, CP (Nickel Development Institute), Personal Communication to J R Divine (ChemMet, Ltd., PC), 3 Feb 2000.
5. Hamner, NE, 1981, *Corrosion Data Survey*, Metals Section, 5th Ed, NACE International, Houston, TX 77218
6. Koch, GH, 1995, *Localized Corrosion in Halides Other Than Chlorides*, MTI Pub No. 41, Materials Technology Institute of the Chemical Process Industries, Inc, St Louis, MO 63141
7. Sedriks, AJ, 1996, *Corrosion of Stainless Steels*, John Wiley & Sons, Inc., New York, NY 10158

Bibliography:

1. Agarwal, DC, *Nickel and Nickel Alloys*, In: Revie, WW, 2000. *Uhlig's Corrosion Handbook*, 2nd Edition, Wiley-Interscience, New York, NY 10158
2. Anderson, TD, 21 December 2000, to JR Divine: No provision for adding nitric or other acid.
3. Davis, JR (Ed), 1994, *Stainless Steels*, In ASM Metals Handbook, ASM International, Metals Park, OH 44073
4. Jones, RH (Ed.), 1992, *Stress-Corrosion Cracking*, ASM International, Metals Park, OH 44073
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6. Uhlig, HH, 1948, *Corrosion Handbook*, John Wiley & Sons, New York, NY 10158
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8. Zapp, PE, 1998, *Preliminary Assessment of Evaporator Materials of Construction*, BNF—003-98-0029, Rev 0, Westinghouse Savannah River Co., Inc for BNFL Inc.

PLANT ITEM MATERIAL SELECTION DATA SHEET

24590-WTP-RPT-PR-04-0001, Rev. B
WTP Process Corrosion Data

PROCESS CORROSION DATA SHEET

Component(s) (Name/ID #) LAW concentrate receipt vessel (LCP-VSL-00001, LCP-VSL-00002)

Facility LAW

In Black Cell? No

Chemicals	Unit[1]	Contract Maximum		Non-Routine		Notes
		Leach	No leach	Leach	No Leach	
Aluminum	g/l	3.87E+01	3.53E+01			
Chloride	g/l	1.84E+01	2.00E+01			
Fluoride	g/l	1.84E+01	2.01E+01			
Iron	g/l	2.84E+00	2.90E+00			
Nitrate	g/l	2.73E+02	2.89E+02			
Nitrite	g/l	8.22E+01	8.93E+01			
Phosphate	g/l	5.93E+01	6.30E+01			
Sulfate	g/l	3.16E+01	3.43E+01			
Mercury	g/l	9.46E-02	3.16E-02			
Carbonate	g/l	1.29E+02	1.11E+02			
Undissolved solids	wt%	5.0%	4.8%			
Other (Pb)	g/l	6.89E-01	2.94E-02			
Other	g/l					
pH	N/A					Note 2
Temperature	°F					Note 3, Note 4

List of Organic Species:

References

System Description: 24590-LAW-3YD-LCP-00001, Rev 0
Mass Balance Document: 24590-WTP-M4C-V11T-00005, Rev A
Normal Input Stream #: TCP03/LCP01
Off Normal Input Stream # (e.g., overflow from other vessels):
P&ID: 24590-LAW-M6-LCP-P0001, 24590-LAW-M6-LCP-P0002, Rev 1
PFD: 24590-LAW-M5-V17T-P0001, -P0002, Rev 0
Technical Reports: N/A

Notes:

1. Concentrations less than 1x 10^{-4} g/l do not need to be reported; list values to two significant digits max.
2. pH 11 to 14.5 (24590-WTP-M4C-V11T-00005, Rev A)
3. T operation 77 °F to 150 °F, T nominal 122 °F(24590-LAW-MVC-LFP-00001, Rev C)
4. The 150 F is maximum temperature from pretreatment and no additional design margin is required.

Assumptions:

PLANT ITEM MATERIAL SELECTION DATA SHEET

24590-WTP-RPT-PR-04-0001, Rev. B
WTP Process Corrosion Data

6.1.1. LAW Concentrate Receipt Vessels (LCP-VSL-00001 and LCP-VSL-00002)

Routine Operations

LAW concentrate receipt vessels (CRV) are designed for receiving waste for melter feed. The equipment associated with the CRVs that promote decontamination and decommissioning includes:

- The internal spray nozzles that spray the inside of the vessel with demineralized water
- Flushing the inside of the vessel with demineralized water (from spray nozzles or transfer from the PT facility) draining of the vessel heel, use of other decontamination solutions (NaOH and so on) through header connections to the spray nozzles during final decontamination and decommissioning

Each LAW CRV is equipped with the following:

- Mechanical agitator (LCP-AGT-00001, -00002)
- Two 100 % pumps (LCP-PMP-00001A/B, -00002A/B) to transfer LAW concentrate
- Internal rotary spray nozzles for periodic wash-down
- Overflow to RLD-VSL-00004, C3/C5 drains/sump collection vessel via a common overflow header
- Pressure, level (redundant), temperature, and density instruments

Non-Routine Operations that Could Affect Corrosion/Erosion

- Overflows to RLD-VSL-00004
- Washing required on failure of agitator

24590-LAW-N1D-LFP-P0004
Rev. 0

PLANT ITEM MATERIAL SELECTION DATA SHEET

R10182903

LFP-VSL-00001, LFP-VSL-00003
LFP-VSL-00002, LFP-VSL-00004,
Melter 1 & 2 Feed & Feed Prep Vessels

- Design Temperature (°F) (Max/min) : 150/40
- Design Pressure (psig) (Max/min): 15/FV
- Location: incell
- Anticipated 40 y radiation dose: gamma <$4x10^5$ rad, alpha <$1.4x10^7$ rad

Offspring items
LFP-AGT-00001 – LFP-AGT-00004
LFP-PMP-00001A/B, LFP-PMP-00003A/B
LFP-PMP-00007 – LFP-PMP-00018
LFP-PMP-00002, LFP-PMP-00004

Contents of this document are Dangerous Waste Permit affecting

Operating conditions are as stated on sheet 5

Operating Modes Considered:
- The vessel is filled with waste at up to 100°F
- The vessel will be washed with demineralized water

ISSUED BY
RPP-WTP PDC
12/29/03
INIT DATE

Assumptions:
- No steam ejector
- There will be no acid used in LAW systems (based on information from T Anderson)

Materials Considered:

Material (UNS No.)	Relative Cost	Acceptable Material	Unacceptable Material
Carbon Steel	0.23		X
304L (S30403)	1.00		X
316L (S31603)	1.18	X	
6% Mo (N08367/N08926)	7.64	X	
Alloy 22 (N06022)	11.4	X	
Ti-2 (R50400)	10.1		X

Recommended Material: Vessels: 316 (max 0.030%C; dual certified)
Agitator: Ultimet, Stellite, or equivalent

Recommended Corrosion Allowance: 0.04 inch; 0.125 inch required on bottom head and shell.

Process & Operations Limitations:
- Develop rinsing/flushing procedure.
- Do not allow untreated process water to remain stagnant in the vessel without approval by Materials Specialist.

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STATE OF WASHINGTON
39250
REGISTERED PROFESSIONAL ENGINEER
12/24/03
EXPIRES: 12/07/05

Please note that source, special nuclear and byproduct materials, as defined in the Atomic Energy Act of 1954 (AEA), are regulated at the U.S. Department of Energy (DOE) facilities exclusively by DOE acting pursuant to its AEA authority. DOE asserts, that pursuant to the AEA, it has sole and exclusive responsibility and authority to regulate source, special nuclear, and byproduct materials at DOE-owned nuclear facilities. Information contained herein on radionuclides is provided for process description purposes only.

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PLANT ITEM MATERIAL SELECTION DATA SHEET

Corrosion Considerations:

a General Corrosion
In normal operation, the vessel will contain only waste. It is possible, also, that the vessel would be flushed with demineralized water.

Hamner (1981) lists a corrosion rate for 304 (and 304L) in NaOH of less than 20 mpy (500 µm/y) at 77°F and over 20 mpy at 122°F. He also states 316 (and 316L) has a rate of less than 2 mpy in 50% NaOH at temperatures up to 122°F. Sedriks (1996) states that the 300 series alloy are acceptable in up to 50% NaOH at temperatures up to about 122°F or slightly above. Similar results were observed by Edgemon et al (1995) for the 242-A Evaporator at Hanford.

In this system, the normal hydroxide and nitrate concentrations and the temperatures are such that 304L and 316L stainless steels will be acceptable.

Conclusion: 304L or 316L is expected to be sufficiently resistant to the waste solution with a probable general corrosion rate of less than 1 mpy.

b Pitting Corrosion
Chloride is known to cause pitting of stainless steels and related alloys in acid and neutral solutions. It is thought that in alkaline solutions, pH>12, chlorides are likely to promote pitting only in tight crevices such as might form after partial removal of deposits during multiple rinse cycles. Koch (1995) is of the opinion that fluoride will have little effect in an alkaline media. Edgemon et al (1995) did not observe pitting in the 242-A Evaporator but the chloride concentrations were only about 0.2% of those in this system.

Normally the vessel is to operate at 93°F. At this temperature, 304L or 316L stainless steels would be acceptable in the proposed alkaline-nitrate waste in the absence of concentrating effects.

If the vessel were filled with process water and left stagnant, there would be a tendency to pit. The time to initiate would depend on the source of the water, being shorter for filtered river water and longer for DIW. Pitting has been observed in both cases, and is likely because residual chlorides are likely to remain.

Conclusion:
Localized corrosion, such as chloride induced pitting, is common but can be mitigated using alloys with higher nickel and molybdenum contents. Based on the expected operating conditions, 316L is expected to be satisfactory.

c End Grain Corrosion
End grain corrosion only occurs in metal with exposed end grains and in highly oxidizing acid conditions.

Conclusion:
Not applicable to this system.

d Stress Corrosion Cracking
The exact amount of chloride required to cause stress corrosion cracking is unknown. In part this is because the amount varies with temperature, metal sensitization, the environment and also because chloride tends to concentrate under heat transfer conditions, by evaporation, and electrochemically during a corrosion process. Hence, even as little as 10 ppm can lead to cracking under some conditions. Generally, as seen in Sedriks (1996) and Davis (1987), chloride stress corrosion cracking does not usually occur below about 104°F. With the proposed temperatures, either 304L or 316L is acceptable.

Conclusion:
At the normal operating conditions 304L and 316L stainless are acceptable.

e Crevice Corrosion
At the proposed operating conditions, 316L is the minimum recommended. See Pitting

Conclusion:
See Pitting.

PLANT ITEM MATERIAL SELECTION DATA SHEET

f Corrosion at Welds
Other than pitting or crevice corrosion, corrosion at welds is not considered a problem in the proposed environment. Heat tint is normally not a consideration in alkaline conditions.

Conclusion:
Weld corrosion is not considered a problem for this system under the stated operating conditions.

g Microbiologically Induced Corrosion (MIC)
The normal operating conditions are not conducive to microbial growth.

Conclusion:
MIC is not considered a problem.

h Fatigue/Corrosion Fatigue
Corrosion fatigue does not appear to be a concern.

Conclusions
Not expected to be a concern.

i Vapor Phase Corrosion
Vapor phase corrosion will be a function of the degree of agitation, solution chemistry, and temperature. Under the stated, conditions, and assuming agitation, 316L will be required.

Conclusion:
Not expected to be a concern.

j Erosion
Velocities are not expected to be high except possibly near the agitators. The bottom should be thicker than the rest of the vessel.

Conclusion:
Increased corrosion allowance on bottom head and shell is acceptable.

k Galling of Moving Surfaces
Not applicable.

Conclusion:
Not applicable.

l Fretting/Wear
No contacting surfaces expected.

Conclusion:
Not applicable.

m Galvanic Corrosion
No significantly dissimilar metals are present.

Conclusion:
Not expected to be a concern.

n Cavitation
None expected.

Conclusion:
Not believed to be of concern.

o Creep
The temperatures are too low to be a concern.

Conclusion:
Not applicable.

PLANT ITEM MATERIAL SELECTION DATA SHEET

References:

1. Davis, JR (Ed), 1987, *Corrosion, Vol 13*, In "Metals Handbook", ASM International, Metals Park, OH 44073
2. Edgemon, GL and RP Anantatmula, 1995, *Hanford Waste Tank Degradation Mechanisms*, WHC-SD-WM-ER-414, Rev 0a, Lockheed Martin Hanford corporation, Richland, WA 99352
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4. Koch, GH, 1995, *Localized Corrosion in Halides Other Than Chlorides*, MTI Pub No. 41, Materials Technology Institute of the Chemical Process Industries, Inc, St Louis, MO 63141
5. Sedriks, AJ, 1996, *Corrosion of Stainless Steels*, John Wiley & Sons, Inc., New York, NY 10158

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1. Agarwal, DC, *Nickel and Nickel alloys*, In: Revie, WW, 2000. *Uhlig's Corrosion Handbook*, 2nd Edition, Wiley-Interscience, New York, NY 10158
2. Davis, JR (Ed), 1994, *Stainless Steels*, In ASM Metals Handbook, ASM International, Metals Park, OH 44073
3. Jones, RH (Ed.), 1992, *Stress-Corrosion Cracking*, ASM International, Metals Park, OH 44073
4. Uhlig, HH, 1948, *Corrosion Handbook*, John Wiley & Sons, New York, NY 10158
5. Van Delinder, LS (Ed), 1984, *Corrosion Basics*, NACE International, Houston, TX 77084
6. Zapp, PE, 1998, *Preliminary Assessment of Evaporator Materials of Construction*, BNF—003-98-0029, Rev 0, Westinghouse Savannah River Co., Inc for BNFL Inc

PLANT ITEM MATERIAL SELECTION DATA SHEET
OPERATING CONDITIONS

Materials Selection Data — Material Selection Data Sheets for the LAW Vitrification Facility

Component (Name/ID)
LAW Melter Feed Process System (LFP) Vessels
Melter Feed Preparation Vessels (LFP-VSL-00001,-3)
Melter Feed Vessels (LFP-VSL-00002,-4)

Operations

Chemicals	Unit	Cold Startup	Normal Operation*	Contract Max**	Cleaning	Accident
					Note 3	Note 4
Aluminum	g/l		15.4	27.2		
Chloride	g/l		2.04	7.5		
Fluoride	g/l		3.27	7.6		
Iron	g/l		0	2.25		
Nitrate	g/l		120	260		
Nitrite	g/l		38	66		
Phosphate	g/l		1.8	14		
TOC†	g/l		2	120		
Sulfate	g/l		12	5.6		
Undissolved solids	g/l		1053	940		
Particle size/hardness	μm (##)					
Other ($NaMnO_4$, Hg, etc)	g/l			0.51 (Pb)		
Carbonate	g/l		27.4			
pH Note 1	-		14.3		0-14	
Dose rate, α, β/γ Note 2	Bq/l		1.33E+06, 2.94E+08			
Temp	°F		93	113	68	
Velocity	fps					
Vibration						
Time of exposure	#		Continuous			

\# - % of total; ## - use Mho scale

* Based on Stream LFP05
** Based on Max contract value mass balance, unreleased

Note 1: Based on envelope A feed properties. pH of feed varies
Note 2: Excluding Tritium, Carbon-14, and Iodine-129.
Note 3: Assume DIW for vessel wash down.
Note 4: Assume same as contract max.

Comments: Vessel contents include LAW concentrate and glass formers. Glass formers include: silica (SiO_2), boric acid (H_3BO_3), aluminum silicate (Al_2SiO_3), calcium silicate ($CaOSiO_2$), ferric oxide (Fe_2O_3), zinc oxide (ZnO), olivine (Mg_2SiO_4), zirconium silicate ($ZrSiO_4$), lithium carbonate (Li_2Co_2), rutile (TiO_2), and sucrose

[X] Wet Process Cell

† List expected organic species: Non-volatile organics and sucrose
Use maximum of 2 significant figures

[X] Flushing

PLANT ITEM MATERIAL SELECTION DATA SHEET

R10672008

LOP-SCB-00001 & LOP-SCB-00002 (LAW)
Melter 1 and Melter 2 Submerged Bed Scrubbers (SBS)

ISSUED BY
RPP-WTP PDC

- Design Temperature (°F)(max/min): 237/41
- Design Pressure (psig) (max/min): 15/FV
- Location: process cell

Contents of this document are Dangerous Waste Permit affecting

Operating conditions are as stated on attached Process Corrosion Data Sheet

Operating Modes Considered:
- Normal operation at pH 3 at the normal operating temperature
- Normal operation at pH 8 at the normal operating temperature
- Vessel is at pH 3 and the temperature reaches 167°F due to loss of cooling jacket function

Materials Considered:

Material (UNS No.)	Relative Cost	Acceptable Material	Unacceptable Material
Carbon Steel	0.23		X
304L (S30403)	1.00		X
316L (S31603)	1.18		X
6% Mo (N08367/N08926)	7.64		X
Alloy 22 (N06022)	11.4	X	
Ti-2 (R50400)	10.1		X

Recommended Material: Hastelloy C-22 or the equivalent; packing is a ceramic

Recommended Corrosion Allowance: 0.040 inch (includes 0.024 inch corrosion allowance and 0.004 inch erosion allowance)

Process & Operations Limitations:
- Develop lay-up strategy

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EXPIRES: 12/07/07

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PLANT ITEM MATERIAL SELECTION DATA SHEET

Corrosion Considerations:

Offgas from the film cooler at a nominal temperature of 572 °F is directed into the SBS column vessel for cooling and solids removal. A cooling jacket located on the outside of the scrubber vessel maintains the required temperatures. Loss of cooling jacket function could allow the solution temperature to rise as high as 167 °F.

a General Corrosion
Wilding and Paige (1976) have shown that in 5% nitric acid with 1000 ppm fluoride at 290°F, the corrosion rate of 304L can be kept as low as 5 mpy by the use of Al^{+++}. Additionally, Sedriks (1996) has noted with 10% (≈2N) nitric acid and 3,000 ppm fluoride at 158°F, the corrosion rate of 304L is over 4,000 mpy; C-22 has a corrosion rate of about 75 mpy. While the anticipated pH in this case is higher, there are regions in the system where the pH is low or where there could be excess fluoride without the presence of aluminum. Consequently, corrosion resistant alloys such as Hastelloy C-22 will be required.

The dissolution rate of the ceramic components in the proposed environment is unknown. However, data from Clark and Zoitos (1992) suggest Al_2O_3, SiC, and ZrO_2 ceramics will have little reactivity in the proposed solutions. The effect of fluoride and the varying temperatures is unclear but the uniform corrosion rate is expected to be larger.

Conclusion:
Hastelloy C-22 or the equivalent is recommended to protect the regions in the scrubber that are exposed to excessive temperatures and concentrations. A high-fired alumina, silicon carbide (reaction bonded and with no free silicon), or zirconia is expected to be a suitably resistant ceramic for the packing.

b Pitting Corrosion
Chloride is known to cause pitting of stainless steels and related alloys in acid and neutral solutions. Normally the vessel is to operate at 113°F at a pH of 3 to 8. Furthermore, the temperature could rise to about 167°F in the case of loss of cooling jacket function. Data from Phull et al (2000) imply that with these conditions, Hastelloy C-22 or equivalent will be needed as a minimum.

Further, if the vessel were filled with process water and left stagnant, there would be a tendency to pit. The time to initiate would depend on the source of the water, being shorter for filtered river water and longer for DIW. Pitting has been observed in both cases, and is likely because residual chlorides are likely to remain. Pitting is less likely for the higher alloys such as C-22.

Conclusion:
Hastelloy C-22 or equivalent is recommended.

c End Grain Corrosion
End grain corrosion only occurs in concentrated acid conditions.

Conclusion:
Not believed likely in this system.

d Stress Corrosion Cracking
The exact amount of chloride required to cause stress corrosion cracking is unknown. In part this is because the amount varies with temperature, metal sensitization, the environment, and because chloride tends to concentrate under heat transfer conditions, by evaporation, and electrochemically during a corrosion process. Hence, even as little as 10 ppm can lead to cracking under some conditions. For the proposed conditions, Hastelloy C-22 or equivalent is required because of its greater resistance to SCC.

Conclusion:
Because of the normal operating environment as well as that which can occur during off normal conditions, the minimum alloy recommended is Hastelloy C-22.

e Crevice Corrosion
See Pitting.

Conclusion:
See Pitting

f Corrosion at Welds
It is expected that the heat tint will be removed during normal operation.

Conclusion:
Weld corrosion is not considered a problem for this system.

PLANT ITEM MATERIAL SELECTION DATA SHEET

g Microbiologically Induced Corrosion (MIC)
The proposed operating conditions are not conducive to microbial growth. The system is downstream of the main entry points of microbes and the air streams are heated to over 500°F.

Conclusion:
MIC is not considered a problem.

h Fatigue/Corrosion Fatigue
Corrosion fatigue is not expected to be a concern. The pressures encountered are so low and the strength of the material is so comparatively high that corrosion fatigue is not a problem.

Conclusions
Should not be a concern.

i Vapor Phase Corrosion
The vapor phase portion of the vessel is expected to be contacted with particles of waste from splashing. It is expected the region will be sufficiently washed to prevent solids deposits.

Conclusion:
Vapor phase corrosion is not believed to be of concern.

j Erosion
Velocities within the vessel are expected to be low. Erosion allowance of 0.004 inch for components with low solids content (< 2 wt%) at low velocities is based on 24590-WTP-RPT-M-04-0008.

Conclusion:
Not believed to be of concern.

k Galling of Moving Surfaces
Not applicable.

Conclusion:
Not applicable.

l Fretting/Wear
No metal/metal contacting surfaces expected.

Conclusion:
Not believed to be of concern.

m Galvanic Corrosion
No dissimilar metals are present.

Conclusion:
Not believed to be of concern.

n Cavitation
None expected.

Conclusion:
Not believed to be of concern.

o Creep
The temperatures are too low to be a concern.

Conclusion:
Not applicable.

p Inadvertent Nitric Acid Addition
At this time, the design does not provide for the presence of nitric acid reagent in this system. Additionally, the scrubbers see low pH under normal operating conditions.

Conclusion:
Not applicable.

PLANT ITEM MATERIAL SELECTION DATA SHEET

References:

1. 24590-WTP-RPT-M-04-0008, Rev. 2, *Evaluation Of Stainless Steel Wear Rates In WTP Waste Streams At Low Velocities*
2. 24590-WTP-RPT-PR-04-0001, Rev. B, *WTP Process Corrosion Data*
3. Clark, DE & BK Zoitos (Editors), 1992, *Corrosion of Glass, Ceramics and Ceramic Superconductors*, Noyes Publications, Park Ridge, NJ 07656
4. Phull, BS, WL Mathay, & RW Ross, 2000, *Corrosion Resistance of Duplex and 4-6% Mo-Containing Stainless Steels in FGD Scrubber Absorber Slurry Environments*, Presented at Corrosion 2000, Orlando, FL, March 26-31, 2000, NACE International, Houston TX 77218.
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6. Wilding, MW and BE Paige, 1976, *Survey on Corrosion of Metals and Alloys in Solutions Containing Nitric Acid*, ICP-1107, Idaho National Engineering Laboratory, Idaho Falls, ID

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1. Agarwal, DC, *Nickel and Nickel Alloys*, In: Revie, WW, 2000. *Uhlig's Corrosion Handbook*, 2nd Edition, Wiley-Interscience, New York, NY 10158
2. Berhardsson, S, R Mellstrom, and J Oredsson, 1981, *Properties of Two Highly corrosion Resistant Duplex Stainless Steels*, Paper 124, presented at Corrosion 81, NACE International, Houston, TX 77218
3. Davis, JR (Ed), 1987, *Corrosion, Vol 13*, In "Metals Handbook", ASM International, Metals Park, OH 44073
4. Davis, JR (Ed), 1994, *Stainless Steels*, In ASM Metals Handbook, ASM International, Metals Park, OH 44073
5. Dillon, CP (Nickel Development Institute), Personal Communication to J R Divine (ChemMet, Ltd., PC), 3 Feb 2000.
6. Hamner, NE, 1981, *Corrosion Data Survey*, Metals Section, 5th Ed, NACE International, Houston, TX 77218
7. Jones, RH (Ed.), 1992, *Stress-Corrosion Cracking*, ASM International, Metals Park, OH 44073
8. Koch, GH, 1995, *Localized Corrosion in Halides Other Than Chlorides*, MTI Pub No. 41, Materials Technology Institute of the Chemical Process Industries, Inc, St Louis, MO 63141
9. Uhlig, HH, 1948, *Corrosion Handbook*, John Wiley & Sons, New York, NY 10158
10. Van Delinder, LS (Ed), 1984, *Corrosion Basics*, NACE International, Houston, TX 77084

PLANT ITEM MATERIAL SELECTION DATA SHEET

24590-WTP-RPT-PR-04-0001, Rev. B
WTP Process Corrosion Data

PROCESS CORROSION DATA SHEET

Component(s) (Name/ID #) SBS and SBS condensate collection vessels (LOP-VSL-00001, LOP-VSL-00002, LOP-SCB-00001, LOP-SCB-00002)

Facility LAW

In Black Cell? No

Chemicals	Unit[1]	Contract Maximum		Non-Routine		Notes
		Leach	No leach	Leach	No Leach	
Aluminum	g/l	5.07E-02	5.12E-02			
Chloride	g/l	1.22E+01	1.35E+01			
Fluoride	g/l	2.61E+00	2.88E+00			
Iron	g/l	2.62E-02	2.54E-02			
Nitrate	g/l	5.85E-02	6.60E-02			
Nitrite	g/l					
Phosphate	g/l					
Sulfate	g/l					
Mercury	g/l	9.93E-01	3.45E-02			
Carbonate	g/l					
Undissolved solids	wt%	1.4%	1.3%			
Other (Pb)	g/l	6.11E-03	3.85E-04			
Other	g/l					
pH	N/A					Note 2
Temperature (note 2)	°F					Note 3

List of Organic Species:

References

System Description: 24590-LAW-3YD-LOP-00001, Rev 0
Mass Balance Document: 24590-WTP-M4C-V11T-00005, Rev A
Normal Input Stream #: LOP01, LOP04
Off Normal Input Stream # (e.g., overflow from other vessels):
P&ID: 24590-LAW-M6-LOP-P0001, 24590-LAW-M6-LOP-P0002, Rev 1
PFD: 24590-LAW-M5-V17T-P0007, -P0008, Rev 0
Technical Reports: N/A

Notes:

1. Concentrations less than 1x 10^{-4} g/l do not need to be reported; list values to two significant digits max.
2. pH 3 to 8 (CCN 025050)
3. Tmin 41, T nominal 113 °F. If loss of cooling jacket function assume 167 °F (24590-LAW-MVC-LOP-00001, Rev B)

Assumptions:

24590-WTP-RPT-PR-04-0001, Rev. B
WTP Process Corrosion Data

6.3.1 SBS and SBS Condensate Vessels (LOP-SCB-00001,2 and LOP-VSL-00001,2)

Routine Operations

Offgas from the film cooler flows through the offgas line then enters the SBS column, which is enclosed in the SBS column vessel (LOP-SCB-00001/2) for further cooling and solids removal. Each melter has a dedicated SBS. The SBS is a passive device designed for aqueous scrubbing of entrained radioactive particulate from melter offgas plus cooling and condensation of melter vapor emissions.

The SBS has two offgas inlets, one for the normal operations line and one for the standby line. The inlet pipes run down through the bed to the packing support plate. The bed-retaining walls extend below the support plate, creating a lower skirt to prevent gas from bypassing the packing. A hold-down screen is used to prevent the bed from being carried out by upward flow through the bed. Gas bubbles are formed as the gas passes through holes in the support plate. The bubbles rise through the packed bed and cause the liquid to circulate up through the packing, and hence downward in the annular space outside the packed bed. The packing breaks larger bubbles into smaller ones to increase the gas-to-water contact area and helps increase the particulate removal and heat transfer efficiencies.

The scrubbed offgas discharges through the top of the SBS. The liquid circulation helps to prevent buildup of captured material in the bed by constantly washing the material away. A cooling jacket located on the outside of the scrubber vessel and cooling coils located inside the vessel maintain the scrubbing liquid at required temperatures.

As the offgas cools, water vapor condenses and increases the liquid inventory. The liquid overflows into the SBS condensate vessel (LOP-VSL-00001/2) located next to the SBS column vessel, thereby maintaining a constant liquid depth in the SBS column vessel. The SBS condensate vessel has a cooling jacket to further cool the condensate. This cooled condensate, when recycled (pumps LOP-PMP-00001/4) to the SBS column vessel, contributes to the cooling of the SBS condensate and keeps collected solids mobilized for removal. The condensate vessel has the capacity to hold about 2 days of condensate. Venting of this vessel is via the SBS column vessel into the main offgas discharge pipe.

To help remove solids, the recirculated stream is pumped through eight lances that agitate the bottom of the SBS column vessel and consolidate the solids near the pump suction. To suspend the solids accumulated in the SBS condensate vessel, an eductor is used, powered by a side stream from the recirculation line.

Condensate produced and solids captured in the SBS column vessels are removed periodically.

Non-Routine Operations that Could Affect Corrosion/Erosion

- Both the SBS and SBS condensate vessels contain spray nozzles that are used during startup to fill the vessels and for decontamination. If maintenance of the offgas line, SBS, or WESP is required during the lifetime of the melter, a maintenance bypass line is provided from the standby offgas line in the wet process cell to the standby line on the other melter. The other melter must be idled for this to occur since the standby line must be open to the SBS, but none of the treatment steps are bypassed.
- **Solids buildup in SBS bed** - This may cause the offgas to bypass the bed with reduced quenching and decontamination. Higher pressure differential indicates a buildup. Depending on the reduction of function, the maintenance bypass is activated and the SBS is flushed out, the bed is fluidized by increasing offgas flow, or the bed is replaced at the next melter changeout.

24590-WTP-RPT-PR-04-0001, Rev. B
WTP Process Corrosion Data

- **Chilled water failure in the SBS** - If the chilled water flow to the SBS fails, the scrubbing solution temperature begins to increase. If the chilled water flow is not restored in a reasonable period, the solution temperature rises and liquid begins to evaporate. The equilibrium temperature reached is about 165 °F (74 °C). Demineralized water is added to either the SBS column or the condensate vessel via the wash header to compensate for water evaporated.
- **Solids buildup in SBS** - This results in reduced liquid flow through the bed, with reduced quenching and decontamination. A higher offgas temperature indicates this problem. Depending on the reduction of function, the melter is idled, the maintenance bypass opened, and the SBS isolated and flushed out. If the problem is not severe, the corrective action may be deferred until the next melter changeout.
- **Loss of SBS pump** - Loss of the SBS water purge pump (LOP-PMP-00003A/6A) interrupts the periodic transfer from the SBS column vessel to the SBS condensate collection vessel. Pump LOP-PMP-00003B/6B acts as a backup and periodically pumps accumulated condensate to the SBS condensate collection vessel until the failed pump is replaced. The spare pump in the SBS condensate vessel (LOP-PMP-00002/5) can also be used to transfer liquid from the system to the SBS condensate collection vessel.
- **Loss of SBS condensate vessel pump** - The SBS condensate vessel has two pumps that have the capability of either recirculating condensate to the SBS or pumping it to the SBS condensate collection vessel. If one fails, the other one acts as a backup until the failed pump is replaced.
- **Loss of eductor in the SBS condensate vessel** - If the eductor fails, the melter is idled, the maintenance bypass is activated, and the offgas line is isolated by closing the isolation valve downstream of the WESP. The eductor is then replaced.

PLANT ITEM MATERIAL SELECTION DATA SHEET

R10672007

LOP-VSL-00001 & LOP-VSL-00002 (LAW)
Melter 1 & Melter 2 SBS Condensate Vessel

ISSUED BY
RPP-WTP PDC

- Design Temperature (°F)(max/min): 237/40
- Design Pressure (psig) (max/min): 15/FV
- Location: incell

Contents of this document are Dangerous Waste Permit affecting

Operating conditions are as stated on attached Process Corrosion Data Sheet

Operating Modes Considered:

- Normal operation at pH 3 at stated nominal operating temperature
- The vessel is pH 8 at stated nominal operating temperature
- Vessel is at pH 3 and temperature reaches 167°F due to loss of cooling function
- Vessel is at pH 8 and temperature reaches 167°F due to loss of cooling function

Materials Considered:

Material (UNS No.)	Relative Cost	Acceptable Material	Unacceptable Material
Carbon Steel	0.23		X
304L (S30403)	1.00		X
316L (S31603)	1.18		X
6% Mo (N08367/N08926)	7.64		X
Alloy 22 (N06022)	11.4	X	
Ti-2 (R50400)	10.1		X

Recommended Material: UNS N06022

Recommended Corrosion Allowance: 0.040 inch (includes 0.024 inch corrosion allowance and 0.004 inch erosion allowance)

Process & Operations Limitations:

- Develop lay-up strategy

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EXPIRES: 12/07/07

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PLANT ITEM MATERIAL SELECTION DATA SHEET

Corrosion Considerations:

Vessels receive liquid overflow from the SBS column vessels. Nominal operating temperature is 113°F with an expected maximum of 167°F.

a General Corrosion
Wilding and Paige (1976) have shown that in 5% nitric acid with 1000 ppm fluoride at 290°F, the corrosion rate of 304L can be kept as low as 5 mpy by the use of Al^{+++}. Additionally, Sedriks (1996) has noted with 10% (≈2N) nitric acid and 3,000 ppm fluoride at 158°F, the corrosion rate of 304L is over 4,000 mpy; C-22 or equivalent has a corrosion rate of about 75 mpy. Because of the possibility of hot, low pH contents with a low Al^{+++}/F^{-} ratio, an alloy more corrosion resistant than the 300 series stainless steels, such as Hastelloy C-22 or equivalent, will be required. With the expected pH ranging between 3 and 8 and the concentration of chloride, 316L is marginally acceptable.

Conclusion:
316L is marginally acceptable with a 6% Mo alloy or Hastelloy C-22 better. C-22 or the equivalent is recommended to protect the vessel from off-normal conditions.

b Pitting Corrosion
Chloride is known to cause pitting in acid and neutral solutions. Normally the vessel is to operate at 113 °F at a pH range of 3 to 8. However, the temperature could approach boiling. Data from Phull et al (2000) imply that with these conditions, 6% Mo is marginal and Hastelloy C-22 or equivalent will be needed as a minimum.

Further, if the vessel were filled with process water and left stagnant, there would be a tendency to pit. The time to initiate would depend on the source of the water, being shorter for filtered river water and longer for DIW. Pitting has been observed in both cases, and is likely because residual chlorides are likely to remain. Pitting is less likely for the higher alloys such as Hastelloy C-22 or equivalent.

Conclusion:
Hastelloy C-22 or the equivalent is recommended.

c End Grain Corrosion
End grain corrosion only occurs in high acid conditions.

Conclusion:
Not believed likely in this system.

d Stress Corrosion Cracking
The exact amount of chloride required to cause stress corrosion cracking is unknown. In part this is because the amount varies with temperature, metal sensitization, the environment, and also because chloride tends to concentrate under heat transfer conditions, by evaporation, and electrochemically during a corrosion process. Hence, even as little as 10 ppm can lead to cracking under some conditions. However, with the proposed off-normal conditions where there will be a tendency to concentrate salts, Hastelloy C-22 or equivalent is required.

Conclusion:
Because of the normal operating environment as well as that which can occur during off-normal conditions, the minimum alloy recommended is Hastelloy C-22 or equivalent.

e Crevice Corrosion
See Pitting. The nominal operating temperature is well above the critical crevice corrosion temperature for 316L and marginal for 6% Mo.

Conclusion:
See Pitting

f Corrosion at Welds
Weld corrosion is not considered a problem for C-22. 316L welds corrode significantly faster than the bulk alloy.

Conclusion:
Not a concern with C-22.

g Microbiologically Induced Corrosion (MIC)
The proposed operating conditions are not conducive to microbial growth – the average operating temperature is approximately correct but the pH is too acid.

Conclusion:
MIC is not considered a problem.

PLANT ITEM MATERIAL SELECTION DATA SHEET

h Fatigue/Corrosion Fatigue
Corrosion fatigue is not expected to be a concern.

Conclusions
Not expected to be a concern.

i Vapor Phase Corrosion
The vapor phase portion of the vessel is expected to be splashed with particles of waste. Hastelloy C-22 is sufficiently resistant. Vapor phase corrosion is not a concern.

Conclusion:
Not expected to be a concern.

j Erosion
Velocities are expected to be low. Erosion allowance of 0.004 inch for components with low solids content (< 2 wt%) at low velocities is based on 24590-WTP-RPT-M-04-0008.

Conclusion:
Not expected to be a concern.

k Galling of Moving Surfaces
Not applicable.

Conclusion:
Not applicable.

l Fretting/Wear
No metal/metal contacting surfaces expected.

Conclusion:
Not expected to be a concern.

m Galvanic Corrosion
No dissimilar metals are present.

Conclusion:
Not expected to be a concern.

n Cavitation
None expected.

Conclusion:
Not believed to be of concern.

o Creep
The temperatures are too low to be a concern.

Conclusion:
Not applicable.

p Inadvertent Nitric Acid Addition
At this time, the design does not provide for the presence of nitric acid reagent in this system. Additionally, the vessels see low pH under normal operating conditions.

Conclusion:
Not applicable.

PLANT ITEM MATERIAL SELECTION DATA SHEET

References:

1. 24590-WTP-RPT-M-04-0008, Rev. 2, *Evaluation Of Stainless Steel Wear Rates In WTP Waste Streams At Low Velocities*
2. 24590-WTP-RPT-PR-04-0001, Rev. B, *WTP Process Corrosion Data*
3. Davis, JR (Ed), 1994, *Stainless Steels*, In ASM Metals Handbook, ASM International, Metals Park, OH 44073
4. Dillon, CP (Nickel Development Institute), Personal Communication to J R Divine (ChemMet, Ltd., PC), 3 Feb 2000.
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6. Phull, BS, WL Mathay, & RW Ross, 2000, *Corrosion Resistance of Duplex and 4-6% Mo-Containing Stainless Steels in FGD Scrubber Absorber Slurry Environments*, Presented at Corrosion 2000, Orlando, FL, March 26-31, 2000, NACE International, Houston TX 77218
7. Sedriks, AJ, 1996, *Corrosion of Stainless Steels*, John Wiley & Sons, Inc., New York, NY 10158
8. Wilding, MW and BE Paige, 1976, *Survey on Corrosion of Metals and Alloys in Solutions Containing Nitric Acid*, ICP-1107, Idaho National Engineering Laboratory, Idaho Falls, ID

Bibliography:

1. Agarwal, DC, *Nickel and Nickel Alloys*, In: Revie, WW, 2000. *Uhlig's Corrosion Handbook*, 2nd Edition, Wiley-Interscience, New York, NY 10158
2. Berhardsson, S, R Mellstrom, and J Oredsson, 1981, *Properties of Two Highly corrosion Resistant Duplex Stainless Steels*, Paper 124, presented at Corrosion 81, NACE International, Houston, TX 77218
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4. Jones, RH (Ed.), 1992, *Stress-Corrosion Cracking*, ASM International, Metals Park, OH 44073
5. Koch, GH, 1995, *Localized Corrosion in Halides Other Than Chlorides*, MTI Pub No. 41, Materials Technology Institute of the Chemical Process Industries, Inc, St Louis, MO 63141
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PLANT ITEM MATERIAL SELECTION DATA SHEET

24590-WTP-RPT-PR-04-0001, Rev. B
WTP Process Corrosion Data

PROCESS CORROSION DATA SHEET

Component(s) (Name/ID #) SBS and SBS condensate collection vessels
(LOP-VSL-00001, LOP-VSL-00002, LOP-SCB-00001, LOP-SCB-00002)

Facility LAW

In Black Cell? No

Chemicals	Unit[1]	Contract Maximum		Non-Routine		Notes
		Leach	No leach	Leach	No Leach	
Aluminum	g/l	5.07E-02	5.12E-02			
Chloride	g/l	1.22E+01	1.35E+01			
Fluoride	g/l	2.61E+00	2.88E+00			
Iron	g/l	2.62E-02	2.54E-02			
Nitrate	g/l	5.85E-02	6.60E-02			
Nitrite	g/l					
Phosphate	g/l					
Sulfate	g/l					
Mercury	g/l	9.93E-01	3.45E-02			
Carbonate	g/l					
Undissolved solids	wt%	1.4%	1.3%			
Other (Pb)	g/l	6.11E-03	3.85E-04			
Other	g/l					
pH	N/A					Note 2
Temperature (note 2)	°F					Note 3

List of Organic Species:

References

System Description: 24590-LAW-3YD-LOP-00001, Rev 0
Mass Balance Document: 24590-WTP-M4C-V11T-00005, Rev A
Normal Input Stream #: LOP01, LOP04
Off Normal Input Stream # (e.g., overflow from other vessels):
P&ID: 24590-LAW-M6-LOP-P0001, 24590-LAW-M6-LOP-P0002, Rev 1
PFD: 24590-LAW-M5-V17T-P0007, -P0008, Rev 0
Technical Reports: N/A

Notes:

1. Concentrations less than 1x 10^{-4} g/l do not need to be reported; list values to two significant digits max.
2. pH 3 to 8 (CCN 025050)
3. Tmin 41, T nominal 113 °F. If loss of cooling jacket function assume 167 °F (24590-LAW-MVC-LOP-00001, Rev B)

Assumptions:

24590-WTP-RPT-PR-04-0001, Rev. B
WTP Process Corrosion Data

6.3.1 SBS and SBS Condensate Vessels (LOP-SCB-00001,2 and LOP-VSL-00001,2)

Routine Operations

Offgas from the film cooler flows through the offgas line then enters the SBS column, which is enclosed in the SBS column vessel (LOP-SCB-00001/2) for further cooling and solids removal. Each melter has a dedicated SBS. The SBS is a passive device designed for aqueous scrubbing of entrained radioactive particulate from melter offgas plus cooling and condensation of melter vapor emissions.

The SBS has two offgas inlets, one for the normal operations line and one for the standby line. The inlet pipes run down through the bed to the packing support plate. The bed-retaining walls extend below the support plate, creating a lower skirt to prevent gas from bypassing the packing. A hold-down screen is used to prevent the bed from being carried out by upward flow through the bed. Gas bubbles are formed as the gas passes through holes in the support plate. The bubbles rise through the packed bed and cause the liquid to circulate up through the packing, and hence downward in the annular space outside the packed bed. The packing breaks larger bubbles into smaller ones to increase the gas-to-water contact area and helps increase the particulate removal and heat transfer efficiencies.

The scrubbed offgas discharges through the top of the SBS. The liquid circulation helps to prevent buildup of captured material in the bed by constantly washing the material away. A cooling jacket located on the outside of the scrubber vessel and cooling coils located inside the vessel maintain the scrubbing liquid at required temperatures.

As the offgas cools, water vapor condenses and increases the liquid inventory. The liquid overflows into the SBS condensate vessel (LOP-VSL-00001/2) located next to the SBS column vessel, thereby maintaining a constant liquid depth in the SBS column vessel. The SBS condensate vessel has a cooling jacket to further cool the condensate. This cooled condensate, when recycled (pumps LOP-PMP-00001/4) to the SBS column vessel, contributes to the cooling of the SBS condensate and keeps collected solids mobilized for removal. The condensate vessel has the capacity to hold about 2 days of condensate. Venting of this vessel is via the SBS column vessel into the main offgas discharge pipe.

To help remove solids, the recirculated stream is pumped through eight lances that agitate the bottom of the SBS column vessel and consolidate the solids near the pump suction. To suspend the solids accumulated in the SBS condensate vessel, an eductor is used, powered by a side stream from the recirculation line.

Condensate produced and solids captured in the SBS column vessels are removed periodically.

Non-Routine Operations that Could Affect Corrosion/Erosion

- Both the SBS and SBS condensate vessels contain spray nozzles that are used during startup to fill the vessels and for decontamination. If maintenance of the offgas line, SBS, or WESP is required during the lifetime of the melter, a maintenance bypass line is provided from the standby offgas line in the wet process cell to the standby line on the other melter. The other melter must be idled for this to occur since the standby line must be open to the SBS, but none of the treatment steps are bypassed.
- **Solids buildup in SBS bed** - This may cause the offgas to bypass the bed with reduced quenching and decontamination. Higher pressure differential indicates a buildup. Depending on the reduction of function, the maintenance bypass is activated and the SBS is flushed out, the bed is fluidized by increasing offgas flow, or the bed is replaced at the next melter changeout.

PLANT ITEM MATERIAL SELECTION DATA SHEET

24590-WTP-RPT-PR-04-0001, Rev. B
WTP Process Corrosion Data

- **Chilled water failure in the SBS** - If the chilled water flow to the SBS fails, the scrubbing solution temperature begins to increase. If the chilled water flow is not restored in a reasonable period, the solution temperature rises and liquid begins to evaporate. The equilibrium temperature reached is about 165 °F (74 °C). Demineralized water is added to either the SBS column or the condensate vessel via the wash header to compensate for water evaporated.
- **Solids buildup in SBS** - This results in reduced liquid flow through the bed, with reduced quenching and decontamination. A higher offgas temperature indicates this problem. Depending on the reduction of function, the melter is idled, the maintenance bypass opened, and the SBS isolated and flushed out. If the problem is not severe, the corrective action may be deferred until the next melter changeout.
- **Loss of SBS pump** - Loss of the SBS water purge pump (LOP-PMP-00003A/6A) interrupts the periodic transfer from the SBS column vessel to the SBS condensate collection vessel. Pump LOP-PMP-00003B/6B acts as a backup and periodically pumps accumulated condensate to the SBS condensate collection vessel until the failed pump is replaced. The spare pump in the SBS condensate vessel (LOP-PMP-00002/5) can also be used to transfer liquid from the system to the SBS condensate collection vessel.
- **Loss of SBS condensate vessel pump** - The SBS condensate vessel has two pumps that have the capability of either recirculating condensate to the SBS or pumping it to the SBS condensate collection vessel. If one fails, the other one acts as a backup until the failed pump is replaced.
- **Loss of eductor in the SBS condensate vessel** - If the eductor fails, the melter is idled, the maintenance bypass is activated, and the offgas line is isolated by closing the isolation valve downstream of the WESP. The eductor is then replaced.

24590-LAW-N1D-LOP-P0003
Rev. 0

PLANT ITEM MATERIAL SELECTION DATA SHEET

R10193553

ISSUED BY RPP-WTP PDC
INIT DATE 2-2-04

LOP-WESP-00001 & LOP-WESP-00002 (LAW)
Melter 1 and Melter 2 Wet Electrostatic Precipitator (WESP)

- Design Temperature (°F)(max/min): 170/45
- Design Pressure (psig)(max/min): -1/+1
- Location: incell

Contents of this document are Dangerous Waste Permit affecting

Operating conditions are as stated on sheet 5

Operating Modes Considered:

- The vessel is at stated pH and at minimum stated temperature, 95°F
- The vessel is at stated pH and at maximum stated temperature, 167°F

Materials Considered:

Material (UNS No.)	Relative Cost	Acceptable Material	Unacceptable Material
Carbon Steel	0.23		X
304L (S30403)	1.00		X
316L (S31603)	1.18		X
6% Mo (N08367/N08926)	7.64	X	
Alloy 22 (N06022)	11.4	X	
Ti-2 (R50400)	10.1		X

Recommended Material: UNS N08367

Recommended Corrosion Allowance: 0.04 inch

Process & Operations Limitations:

- Develop a rinse/flush procedure
- Develop a lay-up strategy

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PLANT ITEM MATERIAL SELECTION DATA SHEET

Corrosion Considerations:

a General Corrosion
Little uniform corrosion is expected for the stated conditions. Either 304L or 316L would be suitable.

Conclusion:
304L or 316L would be acceptable for the conditions stated.

b Pitting Corrosion
Chloride is known to cause pitting in acid and neutral solutions. The normal operating range of temperature for this vessel is 95 °F to 167 °F at a pH in the range 0.71 to 1.57. Data from Phull et al (2000) imply that with these conditions, a 6% Mo alloy or the equivalent will be needed at temperatures above 150°F. With the higher temperature, and expected pH below about 6, a more resistant alloy than 304L or 316L is required.

In addition, because of the high electrical potentials involved, the environment may be more oxidizing than is common. Consequently a strongly pitting resistant alloy is needed.

Further, there would be a tendency to pit if the vessel were filled with process water and left stagnant. The time to initiate would depend on the source of the water, being shorter for filtered river water and longer for DIW. Pitting has been observed in both cases, and is likely caused by residual chlorides. Pitting is less likely for the higher alloys such as a 6% Mo alloy. The use of an alloy with $\leq$ 0.5% Cu is recommended to minimize the effects of mercury.

Conclusion:
Based on the stated operating conditions, 6% Mo is the minimum alloy acceptable.

c End Grain Corrosion
End grain corrosion only occurs in high acid conditions.

Conclusion:
Not believed likely in this system.

d Stress Corrosion Cracking
The exact amount of chloride required to cause stress corrosion cracking is unknown. In part this is because the amount varies with temperature, metal sensitization, the environment, and also because chloride tends to concentrate under heat transfer conditions, by evaporation, and electrochemically during a corrosion process. Hence, even as little as 10 ppm can lead to cracking under some conditions. For the normal operating conditions with good flushing, 316L would be satisfactory. However, with the possible off-normal conditions where there will be a tendency to concentrate salts, a 6% Mo alloy is recommended.

Conclusion:
For the normal operating environment, 316L is satisfactory. However, off normal conditions dictate the necessity for a more resistant alloy such as a 6% Mo.

e Crevice Corrosion
WESPs are known to accumulate solid deposits. Because the solids will probably contain halides, crevice corrosion will be likely. A 6% Mo is recommended. Also see pitting.

Conclusion:
A 6% Mo should be used.

f Corrosion at Welds
Weld corrosion is not expected to be a problem.

Conclusion:
Weld corrosion is not believed to be a problem for this system.

PLANT ITEM MATERIAL SELECTION DATA SHEET

g Microbiologically Induced Corrosion (MIC)
The proposed operating conditions are not conducive to microbial growth – the average operating temperature is approximately correct but the pH is too low.

Conclusion:
MIC is not considered a problem.

h Fatigue/Corrosion Fatigue
Corrosion fatigue is not a concern in a properly designed unit.

Conclusions
Not expected to be a concern.

i Vapor Phase Corrosion
The vapor phase portion of the vessel is expected to be contacted with particles of waste from splashing.

Conclusion:
Not expected to be a concern.

j Erosion
Velocities within the vessel are not expected to be high enough to cause concern.

Conclusion:
Not expected to be a concern.

k Galling of Moving Surfaces
Not applicable.

Conclusion:
Not applicable.

l Fretting/Wear
No metal/metal contacting surfaces expected.

Conclusion:
Not expected to be a concern.

m Galvanic Corrosion
No dissimilar metals are present.

Conclusion:
Not expected to be a concern.

n Cavitation
None expected.

Conclusion:
Not believed to be of concern.

o Creep
The temperatures are too low to be a concern.

Conclusion:
Not applicable.

PLANT ITEM MATERIAL SELECTION DATA SHEET

References:

1. Phull, BS, WL Mathay, & RW Ross, 2000, *Corrosion Resistance of Duplex and 4-6% Mo-Containing Stainless Steels in FGD Scrubber Absorber Slurry Environments*, Presented at Corrosion 2000, Orlando, FL, March 26-31, 2000, NACE International, Houston TX 77218.

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PLANT ITEM MATERIAL SELECTION DATA SHEET

OPERATING CONDITIONS

Materials Selection Data — Material Selection Data Sheets for the LAW Vitrification Facility

Component (Name/ID) LAW WESP LOP-WESP-00001,2
System LOP

Operations

Chemicals	Unit	Cold Startup	Normal Operation*	Contract Max	Cleaning	Accident
		Note 1		Note 2	Note 3	Note 4
Aluminum	g/l		0.1			
Chloride	g/l		1	1.6		
Fluoride	g/l		0.9	1.18		
Hydroxide	g/l		0.035			
Iron	g/l					
Nitrate	g/l					
Nitrite	g/l		0			
Phosphate	g/l					
TOC[‡]	g/l		0			
Sulfate	g/l					
Undissolved solids	g/l		1.5			
Particle size/hardness	µm (##)					
Other (Na, etc.)	g/l		2.5			
Carbonate	g/l		0			
pH	-		0.71 to 1.57		1 to 14	
Temperature	°F		95 - 167		deleted	deleted
Velocity	fps					
Vibration						
Time of exposure	#		continuous		1 week	

*Based on Stream #LV222/LV222A

- % of total; ## - use Mho scale

Notes:
Note 1: Assume same as normal operations minus radionuclides except as noted.
Note 2: Max contract value mass balance, unreleased.
Note 3: Assume everything from phosphate based cleaning products to strong acids and bases.
Note 4: High voltage electrodes may arc to pipe walls in the presence of water vapor and acid gases.
Note 5: deleted

Comments: Pressure can be from +10 to -80 in. W.G.

☐ Black Cell

☐ Flushing

[‡] List expected organic species:
Use maximum of 2 significant figures

PLANT ITEM MATERIAL SELECTION DATA SHEET

R10339150

LOP-Offgas Piping (downstream of film cooler to SBS entry)

- Design Temperature (°F): 1200
- Design Pressure (psig) (max/min): 15/FV

Operating conditions are as stated on sheet 6

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RPP-WTP PDC
INIT DATE

Operating Modes Considered:

- Normal operation, less than 1112 °F
- Washing of the pipeline to remove deposits

Materials Considered:

Material	Acceptable Material	Unacceptable Material
Inconel 690	X (piping)	
Inconel 625	X (piping)	
Inconel 625LCF	X (bellows)	

Recommended Material:

- **Offgas pipe:** Alloy 625 or 690
- **Bellows:** Alloy 625LCF

Recommended Corrosion Allowance: None Required.

Process & Operations Limitations:

None

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PLANT ITEM MATERIAL SELECTION DATA SHEET

Corrosion Considerations:

Inconel® 690 has been used at West Valley and Savannah River Site for the melter offgas line. Because Inconel 625LCF has better fatigue properties, it has been proposed for use for the WTP LAW offgas bellows. Consequently, the question has been raised as to whether it can be used for the entire line. The following discussion reviews the behavior of alloys 690, 625, and 625LCF.

a General Corrosion
The design temperature is 1200 °F (649 °C) though normal operating temperatures will be closer to 572 °F (300 °C) with the high normal of 1112 °F (600 °C). According to the chemistry data sheet, attached, the oxygen content is about 13% or about 0.13 atm. Based on Wright (1987), the parabolic rate constant in a 0.13 atm oxygen system at 1800 °F is approximately 5×10^{-11} g^2/cm^4sec. For exposure over the five-year design life of the melter, the amount of oxidation is estimated at 3 mil (approximately 0.6 mpy) at 1112 °F.

All nickel alloys potentially suffer from the sulfidation problem. Alloy 690 with its higher chromium content is expected to be more resistant to sulfidation than the 625 series. Nevertheless, during normal operation, the sulfur to oxygen (S/O) ratio is approximately 1×10^{-3}, which is consistent with the fact that the high oxygen concentration, approximately 13%, will tend to keep the sulfur oxidized. According to Wright (1987), severe sulfidation occurs in reducing atmospheres if the S/O ratio is 1×10^{15} at about 1112 °F (600 °C). However, during normal operation at 572 °F (300 °C), oxidation is expected to predominate the corrosion reaction. Usually the lowest sulfidation temperature of concern is 1200 °F (650 °C), (Lai & Patriarca 1987), which is well above the operating temperature.

Vitreous State Laboratory, VSL, noted significant amounts of sulfate deposit during operation (Andre 2003). Andre does not note the temperature but Duratek (Duratek A) typically reports 200 °C to 600 °C (≈400 °F to 1110 °F). It should be noted that in the case of breaks in the oxide that allow contact with the deposits, rapid failure could occur because of the presence of low melting point salts, such as mixtures of Na_2SO_4, NaOH, $NaNO_2$, and $NaNO_3$, that can act as a flux at temperatures as low as 154 °C (310 °F). After about 3 years of operation with an alloy C-276 offgas line, Andre (2003) reported no sulfidation or corrosion in the offgas line.

Duratek (Duratek B) tested several nickel base alloys, Table I, in the pilot plant melter offgas line. Alloy 690 averaged about 0.3 mpy. Although alloy 625 was not tested, it should perform similarly to alloys C-22 and C-276.

Table I - Offgas Corrosion Rates

Alloy	C-22	C-276	6025HT	690	310	HR160
Corrosion rate, mpy	0.81-1.2	0.43-0.93	0-0.17	0.3	1.1	0.56-1.8

Discussions with staff familiar with West Valley and VSL studies, suggest the periodic washing of the offgas line does not significantly affect the uniform corrosion rate.

Conclusion:
Although nickel base alloys are potentially susceptible to sulfidation above about 1110 °F (600 °C), the atmosphere in the offgas line is sufficiently oxidizing to inhibit it for the listed alloys. Alloys such as 690, 625, 625LCF, and even C-22 and C-276 are acceptable and have roughly the same corrosion behavior. Because the piping is maintainable, and because the piping is thick and is carrying only hot gas, no corrosion allowance is necessary.

b Pitting Corrosion
Pitting corrosion, as such, is not feasible under the proposed operating conditions.

Duratek (Duratek B) also observed that pitting rates, Table II, typically were much less than 1 mpy. Again, alloy 625 was not tested but should perform similarly to alloys C-22 and C-276. The most likely occurrence of pitting is during, or shortly after the duct is washed to remove deposits.

Table II - Offgas Pitting Rates

Alloy	C-22	C-276	6025HT	690	310	HR160
Pitting rate, mpy	0.08-0.16	0.06	0.4	0.04	0.15	0.15-1.8

Conclusion:
No significant pitting concerns exist for the potential alloys of choice.

PLANT ITEM MATERIAL SELECTION DATA SHEET

c End Grain Corrosion
Not applicable to this system.

Conclusion:
Not applicable to this system.

d Stress Corrosion Cracking
The high nickel content of the various alloys is expected to inhibit chloride stress corrosion cracking under aqueous conditions.

Long-term operation in the 800 °F to 1650 °F (425 °C to 900 °C) range leads to carbide precipitation, with the carbides forming faster as the temperature increases. At the normal operating temperature, all of the alloys in question will experience carbide formation with a subsequent decrease in ductility.

Conclusion:
The dry environment should minimize stress corrosion cracking and intergranular corrosion.

e Crevice Corrosion
See Pitting.

Conclusion:
See Pitting.

f Corrosion at Welds
Low carbon alloys will be less likely to sensitize.

Conclusion:
No problem expected.

g Microbiologically Induced Corrosion (MIC)
Temperature exceeds values where microbes are viable and therefore MIC is not a concern.

Conclusion:
Not a concern.

h Fatigue/Corrosion Fatigue
Stresses from pressure effects are expected to be small because of the low, near atmospheric, operating pressure and the relatively small pressure fluctuations. Higher stresses are expected in the bellows due to thermal cycling.

The Special Metals technical manuals for alloy 690 (2002), alloy 625 (2002), and alloy 625LCF (2003) show that fatigue resistance increases for the alloys in the order shown. Therefore, the high corrosion resistance of 625LCF combined with its improved fatigue strength makes it the preferred choice for the thin ply bellows.

Conclusion:
Alloy 625LCF should be used for the thin ply bellows. Alloys 690 and 625 are acceptable for the balance of the offgas system piping.

i Vapor Phase Corrosion
The entire pipe is "vapor phase" and its expected performance is discussed in section 'a'.

Conclusion:
Not applicable

j Erosion
The offgas flow rates are sufficiently low that solids deposit in the line. Therefore, erosion is not expected.

Conclusion:
Erosion is not a concern.

PLANT ITEM MATERIAL SELECTION DATA SHEET

k Galling of Moving Surfaces
Galling is not considered important since there are no frequently cycled sliding joints.

Conclusion:
Galling is not a concern.

l Fretting/Wear
No tight sliding joints are present.

Conclusion:
Fretting is not a concern.

m Galvanic Corrosion
The pipe is all one material and normally dry. Galvanic corrosion should not occur.

Conclusion:
Not a concern.

n Cavitation
Flowing fluids are not present.

Conclusion:
Not a concern.

o Creep
According to the 625 and 625 LCF alloy data, creep is not a significant concern at or below 1110 °F (600 °C) although most nickel alloys, including alloy 690, begin to exhibit creep at temperatures above 1000 °F (535 °C).

Conclusion:
Not a concern during normal operation at 572 °F (300 °C) for any of the three alloys.

PLANT ITEM MATERIAL SELECTION DATA SHEET

References

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2. Duratek A, *RPP-WTP Pilot Melter Off-gas Treatment System Corrosion Test Results Report*, TRR-PLT-22A, Rev 0, GTS Duratek, Columbia, MD
3. Duratek B, *RPP-WTP Pilot Melter Off-gas Treatment System Corrosion Test Results Report*, TRR-PLT-22B, Rev 0, GTS Duratek, Columbia, MD
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PLANT ITEM MATERIAL SELECTION DATA SHEET

OPERATING CONDITIONS

Materials Selection Data

Component (Name/ID) Melter Offgas Line to SBS

System LOP (LAW Melter Primary Offgas)

Operations

Chemicals	Unit	Cold Startup	Normal Operation	High Normal	Cleaning	Accident
Oxygen	%	20	13	15	NC	7
Chlorine	ppmv	0	trace			
Fluorine	ppmv	0	trace			
Nitric Oxide (NO)	ppmv	0	4000	7000	NC	10000
Nitrogen Dioxide (NO2)	ppmv	0	2000	4000	NC	6000
Sulfur Dioxide (SO2)	ppmv	0	8	55	NC	200
Ammonia (NH3)	ppmv	0	50	100	NC	200
Carbon Monoxide (CO)	ppmv	0	400	600	NC	2000
Carbon Dioxide	%		2	2.5	NC	5
Particulate	g/dscf	0	0.033	0.05	N/A	0.2
Hydrochloric Acid (HCl)	ppmv	0	5	10	NC	20
Hydrofluoric Acid (HF)	ppmv	0	12	20	NC	40
Water (H2O)	%	0	35	40	60	80
Vacuum	in. W.G.	2	6	7	6	25
Temperature	°F	6	930	1110 (~600°C)	750	1650 (~900°C)
Velocity	fps	70	60	100	70	150

Comments: Base material selection on 600°C max.

N/A = Information not available
NC = No Change

† List expected organic species:
Use maximum of 2 significant figures

PLANT ITEM MATERIAL SELECTION DATA SHEET

R10339151

LVP-TK-00001 (LAW)
CAUSTIC COLLECTION TANK

- Design Temperature (°F)(max/min): 180/50
- Design Pressure (psig): per Code
- Location: outcell

ISSUED BY RPP-WTP PDC
7/20/04
INIT DATE

Contents of this document are Dangerous Waste Permit affecting

Operating conditions are as stated on sheet 5 and 6

Materials Considered:

Material (UNS No.)	Relative Cost	Acceptable Material	Unacceptable Material
Carbon Steel	0.23		X
304L (S30403)	1.00		X
316L (S31603)	1.18	X	
6% Mo (N08367/N08926)	7.64	X	
Alloy 22 (N06022)	11.4	X	
Ti-2 (R50400)	10.1		X

Recommended Material: 316 (max 0.030% C; dual certified)

Recommended Corrosion Allowance: 0.04 inch (includes 0.00 inch erosion allowance)

Process & Operations Limitations:

- None

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Corrosion Considerations:

The tank receives scrubbing liquid from LVP-SCB-00001. It will operate at about 140 to 150 °F and range in pH from 7 to 12 with a nominal value of 9.

a General Corrosion
Hamner (1981) lists a corrosion rate for 304 (and 304L) in NaOH of less than 20 mpy (500 μm/y) at 77°F and over 20 mpy at 122°F. He shows 316 (and 316L) has a rate of less than 2 mpy up to 122°F and 50% NaOH. Sedriks (1996) states that the 300 series are acceptable in up to 50% NaOH at temperatures up to about 122°F or slightly above. Indications are that in the present system, the uniform corrosion rate is negligible.

Conclusion:
304L or 316L are acceptable for use in the stated conditions.

b Pitting Corrosion
Chloride is likely to cause pitting in acid and slightly alkaline solutions. Berhardsson et al (1981) suggest that at chloride concentrations of a few hundred parts per million, a temperature of 150°F would compatible with 316L. At the stated concentrations of 800 to 1900 ppm chloride and the given temperatures, pitting will be a strong function of pH. At the nominal pH or 9 or higher, 316L is satisfactory. Should the halide concentrations rise above nominal, the pH of the solution will need to be adjusted to at least 12.

If the solution will remain below about pH 7 for any length of time at 150°F, 6% Mo or better should be used. Phull et al (2000) note that 6% Mo is acceptable to about pH 5 and 150°F in high chloride environments. Lower pH values and higher temperatures would require Hastelloy C-22 or the equivalent.

Conclusion:
Localized corrosion, such as pitting, is a concern. However, 316L is satisfactory for the nominal halide concentrations, pH and temperature and assuming that the pH will be adjusted should the halide concentrations rise above nominal.

c End Grain Corrosion
End grain corrosion only occurs in metal with exposed end grains and in highly oxidizing acid conditions.

Conclusion:
Not believed likely in this system.

d Stress Corrosion Cracking
The exact amount of chloride required to cause stress corrosion cracking is unknown. In part this is because the amount varies with temperature, metal sensitization, and the environment. But it is also unknown because chloride tends to concentrate under heat transfer conditions, by evaporation, and electrochemically during a corrosion process. Hence, even as little as 10 ppm can lead to cracking under some conditions. Generally, as seen in Sedriks (1996) and Davis (1987), stress corrosion cracking does not usually occur below about 140°F. Berhardsson (1981) suggests that 316L is acceptable under these conditions up to a temperature of about 150°F.

Conclusion:
Under the normal operating environment, 316L is recommended.

e Crevice Corrosion
Although crevice corrosion is possible, the same alloy choices as for pitting are acceptable. Also see Pitting.

Conclusion:
See Pitting

f Corrosion at Welds
Corrosion at welds is not considered a problem in the proposed environment.

Conclusion:
Weld corrosion is not considered a problem for this system.

g Microbiologically Induced Corrosion (MIC)
The proposed operating conditions are conducive to microbial growth, but the proposed alloys tend to be resistant.

Conclusion:
MIC is not considered a problem.

h Fatigue/Corrosion Fatigue
Corrosion fatigue is a not expected to be a problem.

Conclusions
Not expected to be a concern.

PLANT ITEM MATERIAL SELECTION DATA SHEET

i Vapor Phase Corrosion
The vapor phase portion of the vessel is expected to be contacted with particles of waste from splashing. It is unknown whether this will be sufficiently washed or whether residual acids or solids will be present. Because solids or acids and solids may be present, a 316L or better would be preferred.

Conclusion:
Vapor phase corrosion is not a concern.

j Erosion
Velocities within the vessel are expected to be low.

Conclusion:
Erosion is not a concern.

k Galling of Moving Surfaces
Not applicable.

Conclusion:
Not applicable.

l Fretting/Wear
No contacting surfaces expected.

Conclusion:
Not applicable.

m Galvanic Corrosion
No dissimilar metals are present.

Conclusion:
Not applicable.

n Cavitation
None expected.

Conclusion:
Not a concern.

o Creep
The temperatures are too low to be a concern.

Conclusion:
Not applicable.

p Inadvertent Nitric Acid Addition
At this time, nitric acid reagent is not available in this system.

Conclusion:
Not applicable.

PLANT ITEM MATERIAL SELECTION DATA SHEET

References:

1. Berhardsson, S, R Mellstrom, and J Oredsson, 1981, *Properties of Two Highly corrosion Resistant Duplex Stainless Steels*, Paper 124, presented at Corrosion 81, NACE International, Houston, TX 77218
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PLANT ITEM MATERIAL SELECTION DATA SHEET

OPERATING CONDITIONS

PROCESS CORROSION DATA SHEET

Component(s) (Name/ID #) Caustic Collection Tank (LVP-TK-00001)

Facility LAW

In Black Cell? No

Chemicals	Unit[1]	Contract Maximum		Non-Routine		Notes
		Leach	No leach	Leach	No Leach	
Aluminum	g/l					
Chloride	g/l	8.64E-01	1.87E+00			
Fluoride	g/l	2.21E+00	4.78E+00			
Iron	g/l					
Nitrate	g/l	3.84E+00	8.28E+00			
Nitrite	g/l					
Phosphate	g/l					
Sulfate	g/l					
Mercury	g/l					
Carbonate	g/l					
Undissolved solids	wt %					
Other (Pb)	g/l					
Other	g/l					
pH	N/A					Note 3
Temperature	°F					Note 2

List of Organic Species:

Notes:

1. Concentrations less than 1x 10^{-4} g/l do not need to be reported; list values to two significant digits max.
2. Normal inlet offgas temp is 560 °F maximum unquenched inlet offgas temp is 1025 °F
   caustic scrubber blowdown 142 °F to 149 °F
3. Tank has a nominal pH of 9. Should high halides, greater than 0.3 g/l, be detected in the scrubber upstream, the pH will be raised to 14.

Assumptions:

6.4.9 Caustic Scrubber and Caustic Collection Tank (LVP-SCB-00001, LVP-TK-00001)

Routine Operations

The caustic scrubber (LVP-SCB-00001) further treats the offgas by removing acid gases such as SO_x and CO_2. It also provides offgas cooling.

The offgas stream enters the bottom side of the scrubber and flows upward through a packed bed. The offgas flows countercurrent to the scrubbing liquid, which is introduced through a distributor at the top of the packed section of the column and flows downward through the packing media. Contaminants in the offgas stream are absorbed into the liquid.

The offgas is cooled through the scrubber by evaporation of scrubbing liquid and exits at nearly 100 % relative humidity. The scrubbing liquid drains into the caustic collection tank (LVP-TK-00001). This liquid is recirculated to the top of the column using the caustic scrubber recirculation pumps (LVP-PMP-00001A/B)

The vessel is fitted with radar type liquid level instrumentation. Density, temperature, and flow are measured on the recirculation line. Capability for sampling the vessel is provided using a tap from the recirculation pump line. The vessel is vented to the room. The caustic collection vessel (LVP-TK-00001) overflows to the berm around the vessel.

Water is added directly to the vessel at a rate sufficient to maintain a specific gravity in the scrubbing fluid consistent with a maximum of 10 % dissolved solids. Suspended solids are not expected.

Offgas from the caustic scrubber is environmentally monitored (stack discharge monitoring [rad and non-rad] system [SDJ]) then released via the stack.

Non-Routine Operations that Could Affect Corrosion/Erosion

- The caustic scrubber has provisions for process water addition for startup and to provide makeup water as necessary. A spray wash ring is also provided for washdown during maintenance periods.
- If the caustic scrubber needs maintenance, a bypass line is provided to allow continued operation of the main offgas system after the melters are idled.
- **Loss of caustic flow to the collection tank -** Loss of caustic flow results in decreased pH of the scrubber bottoms. If the problem can be resolved readily, the scrubber column can continue operating, since the pH decreases slowly. If the problem is more serious, the melters are idled and the caustic scrubber bypass is activated until caustic flow is reestablished.
- **Loss of recirculation pumps -** Loss of recirculation results in the inability to remove acid gases and iodine. An installed spare pump is provided to quickly restore flow to the column.
- **Plugging of packed bed -** If the pressure drop across the packed bed increases beyond a normal range, the melters are idled, the column is bypassed, and the bed is flushed to remove deposits. If this is not effective, the melters are idled, the bypass opened, and the bed replaced.
- **Caustic collection vessel overflow -** The vessel overflows to the berm around the tank. The berm drains to the plant wash vessel (RLD-VSL-00003).
- **Solids buildup in the caustic collection vessel -** Minimal solids are expected in the caustic collection vessel. When not transferring to the PT facility, the transfer pumps recirculates back to the collection tank. Caustic is injected into the pump suction to maintain the correct pH in the tank. Any solids are removed from the vessel, and the liquid is transferred to the PT facility.
- **Loss of transfer pump -** If the primary pump fails, the backup pump is activated and operated while the failed pump is replaced.

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24590-LAW-N1D-RLD-P0001
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VESSEL/TANK MATERIAL SELECTION DATA SHEET

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RLD-VSL-00004 (LAW)
C3/C5 Drains/Sump Collection Vessel

- Design Temperature (°F)(Max/min): 183/-20
- Design Pressure (psig) (Max/min): 15/FV
- Anticipated 40 y radiation dose: gamma <$4x10^5$ rad, alpha <$1.4x10^7$ rad

Operating conditions are as stated on sheet 5

Can be maintained, not replaced, during the 40 y design life. No method of totally removing solids or heels is present.

Operating Modes Considered:

- The tank is filled with waste at between 59 and 158°F and drain waste
- Rinsed with plant water, a heel is expected to remain

Materials Considered:

Material (UNS No,.)	Relative Cost	Acceptable Material	Unacceptable Material
Carbon Steel	0.23		X
304L (S30403)	1.00		X
316L (S31603)	1.18	X	
6% Mo (N08367/N08926)	7.64	X	
Alloy 22 (N06022)	11.4	X	
Ti-2 (R50400)	10.1	X	

Recommended Material: 316 (max 0.030% C; dual certified). Bottom head to be clad with 0.1 inch of Inco 625 (UNS N06625) material or better.

Recommended Corrosion Allowance: 0.04 inch

Process & Operations Limitations:

- develop lay-up strategy

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Sheet: 1 of 5

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VESSEL/TANK MATERIAL SELECTION DATA SHEET

Corrosion Considerations:

a General Corrosion
In normal operation, the vessel will contain WESP purge and any fluids flushed down the drains.

Wilding and Paige (1976) have shown that in 5% nitric acid with 1,000 ppm fluoride at 290°F, the corrosion rate of 304L and 316L can be kept as low as 5 mpy by the use of Al^{+++}. Additionally, Sedriks (1996) has noted with 10% (≈2N) nitric acid and 3,000 ppm fluoride at 158°F, the corrosion rate of 304L and 316L is over 4,000 mpy. The fluoride concentration in this situation is 900 ppm , the normal operating pH ranges from 0.71 to 1.57, and the normal operating temperature is 115°F. Based on the available data, the uniform corrosion rate will be small.

Conclusion:
304L and 316L are expected to be sufficiently resistant to the waste solution with a probable general corrosion rate of less than 1 mpy.

b Pitting Corrosion
Chloride is known to encourage pitting of stainless steel and related alloys in acid and neutral solutions. Alloys with higher molybdenum contents are more resistant to pitting. The stated conditions of pH and chloride conditions for this vessel are sufficient to cause 316L to be a marginal choice. However, with the cladding of the bottom head with a more resistant alloy, 316L is deemed satisfactory.

Conclusion:
Localized corrosion, such as pitting, is common but can be mitigated, if caused by chlorides, by alloys with higher nickel and molybdenum contents. Based on the expected operating conditions, 316L would be expected to be satisfactory with the addition of cladding of the bottom head.

c End Grain Corrosion
End grain corrosion only occurs in metal with exposed end grains and in highly oxidizing acid conditions.

Conclusion:
End grain corrosion, as normally defined, is not a concern.

d Stress Corrosion Cracking
The exact amount of chloride required to cause stress corrosion cracking is unknown. In part this is because the amount varies with temperature, metal sensitization, the environment and because chloride tends to concentrate under heat transfer conditions, by evaporation, and electrochemically during a corrosion process. Hence, even as little as 10 ppm can lead to cracking under some conditions. Generally, as seen in Sedriks (1996) and Davis (1987), chloride stress corrosion cracking does not usually occur below about 104°F. Further, the "L" grade stainless steels are more resistant. With the proposed conditions, 316L will be acceptable.

Conclusion:
For the normal operating environment, a 316L is the minimum recommended.

e Crevice Corrosion
Though the solids content is not excessive, there is no good method for removing all deposits or heels. At the proposed operating temperature 304L and 316L alone are not acceptable. Either cladding the bottom head of the vessel is necessary or 6% Mo alloy or better is recommended. In addition, see Pitting.

Conclusion:
See pitting.

f Corrosion at Welds
Other than pitting or crevice corrosion, corrosion at welds is not considered a major problem in the proposed environment. Heat tint is normally not a consideration in alkaline conditions.

Conclusion:
Weld corrosion is not considered a problem for this system under normal operating conditions.

g Microbiologically Induced Corrosion (MIC)
The normal operating conditions are not conducive to microbial growth.

Conclusion:
MIC is not considered a problem.

h Fatigue/Corrosion Fatigue
Corrosion fatigue does not appear to be a concern in the vessel.

Conclusions
Not a concern.

VESSEL/TANK MATERIAL SELECTION DATA SHEET

i Vapor Phase Corrosion
Vapor phase corrosion will be a function the degree of agitation, solution chemistry, and temperature. Under normal operating conditions, vapor phase corrosion is not expected to be a concern.

Conclusion:
Not believed to be a concern. 316L is expected to be satisfactory.

j Erosion
There is no agitation in the vessel.

Conclusion:
Not applicable.

k Galling of Moving Surfaces
Not applicable.

Conclusion:
Not applicable.

l Fretting/Wear
No contacting surfaces expected.

Conclusion:
Not applicable.

m Galvanic Corrosion
No significantly dissimilar metals are present.

Conclusion:
Not expected to be a concern.

n Cavitation
None expected.

Conclusion:
Not believed to be of concern.

o Creep
The temperatures are too low to be a concern.

Conclusion:
Not applicable.

VESSEL/TANK MATERIAL SELECTION DATA SHEET

References:

1. deleted
2. Davis, JR (Ed), 1987, *Corrosion, Vol 13*, In "Metals Handbook", ASM International, Metals Park, OH 44073
3. deleted
4. Koch, GH, 1995, *Localized Corrosion in Halides Other Than Chlorides*, MTI Pub No. 41, Materials Technology Institute of the Chemical Process Industries, Inc, St Louis, MO 63141
5. Sedriks, AJ, 1996, *Corrosion of Stainless Steels*, John Wiley & Sons, Inc., New York, NY 10158
6. Wilding, MW and BE Paige, 1976, *Survey on Corrosion of Metals and Alloys in Solutions Containing Nitric Acid*, ICP-1107, Idaho National Engineering Laboratory, Idaho Falls, ID

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1. Agarwal, DC, *Nickel and Nickel alloys*, In: Revie, WW, 2000. *Uhlig's Corrosion Handbook*, 2nd Edition, Wiley-Interscience, New York, NY 10158
2. Davis, JR (Ed), 1994, *Stainless Steels*, In ASM Metals Handbook, ASM International, Metals Park, OH 44073
3. Hamner, NE, 1981, *Corrosion Data Survey*, Metals Section, 5th Ed, NACE International, Houston, TX 77218
4. Jones, RH (Ed.), 1992, *Stress-Corrosion Cracking*, ASM International, Metals Park, OH 44073
5. deleted
6. deleted
7. deleted
8. Uhlig, HH, 1948, *Corrosion Handbook*, John Wiley & Sons, New York, NY 10158
9. Van Delinder, LS (Ed), 1984, *Corrosion Basics*, NACE International, Houston, TX 77084

VESSEL/TANK MATERIAL SELECTION DATA SHEET

OPERATING CONDITIONS

deleted

Material Selection Data Sheets for the LAW Vitrification Facility

Materials Selection Data

Component (Name/ID) C3/C5 Drains/Sump Collection Vessel (RLD-VSL-00004); RLD-EDUC-00001A -00001B,-00001C; RLD-PMP-00002A/B

System RLD

Operations

Chemicals	Unit	Cold Startup	Normal Operation*	Contract Max**	Cleaning	Accident
		Note 1			Note 3	Note 4
Aluminum	g/l					5.72
Chloride	g/l		1.06	1.6		3.12
Fluoride	g/l		0.9	1.2		4.99
Iron	g/l		0.01			
Nitrate	g/l			21.5		178
Nitrite	g/l					58.5
Phosphate	g/l					
TOC†	g/l					2.99
Sulfate	g/l			0.52		18
Undissolved solids	g/l		1.48			937
Particle size/hardness	µm (##)					
Other ($NaMnO_4$, Hg, etc)	g/l			0.51 (Pb) Note 5		0.51 (Pb) Note 5
Carbonate	g/l					41.8
pH	-		0.71 to 1.57 (Note 2)			14.5
Temperature	°F		115			
Velocity	fps					
Vibration						
Time of exposure	#					

* Based on deleted

\# - % of total; ## - use Mho scale

** Based on Max contract value mass balance, unreleased, sum of stream LOP07

Assumptions:

Remarks:

Note 1: Same as normal operation minus the radionuclides.

Note 2: Matlack, Keith S, "Integrated Off-Gas System Tests on the DM1200 Melter with RPP-WTP LAW Sub-Envelope Al Simulants", VSL-02R88002, Rev. 0, Vitreous State Laboratory The Catholic University of America, Washington, DC 20064, Duratek, Inc. September 3, 2002, pp T-29 to T-31. The C3/C5 vessel receives mainly WESP purge.

Note 3: Assume water.

Note 4: Can receive over flows from melter feed and concentrate receipt vessels and fire water. Based on worst from LP108/LV105 and LV106/LV104

Note 5: Base on max contract value mass balance from melter feed overflow.

☐ Black Cell

☐ Flushing

† List expected organic species:

Use maximum of 2 significant figures

MASTER DISTRIBUTION SCHEDULE

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NA										

Mark Hoffmann
Approver's Name (Print)

Approver's Signature

4/3/03
Date

PLANT ITEM MATERIAL SELECTION DATA SHEET

R1017022

RLD-VSL-00005 (LAW)
SBS Condensate Collection Vessel

- Design Temperature (°F)(Max/min): 200/40
- Design Pressure (psig) (max/min): 15/FV
- Location: incell
- Anticipated 40 y radiation dose: gamma <4×10^5 rad, alpha <1.4×10^7 rad

Offspring items

RLD-AGT-00002, RLD-PMP-00003A/B

ISSUED BY RPP-WTP PDC
INIT DATE 11/19/03

Contents of this document are Dangerous Waste Permit affecting

Operating conditions are as stated on sheet 5

There is an agitator but there is no method for totally removing deposits or heels.

Operating Modes Considered:

- Only operation to the design temperature is assumed.

Materials Considered:

Material (UNS No,.)	Relative Cost	Acceptable Material	Unacceptable Material
Carbon Steel	0.23		X
304L (S30403)	1.00		X
316L (S31603)	1.18		X
6% Mo (N08367/N08926)	7.64	X	
Alloy 22 (N06022)	11.4	X	
Ti-2 (R50400)	10.1		X

Recommended Material: UNS N08367/N08926

Top head: 316 (max 0.030% C; dual certified)

The pH, high chloride, and solids require a 6% Mo material for body of vessel and an Alloy 22 or 6% Mo material for the process nozzles consistent with the connecting piping.

Recommended Corrosion Allowance: 0.04 inch

Process & Operations Limitations:

- develop lay-up strategy
- develop rinsing/flushing procedure

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EXPIRES: 12/07/03

Please note that source, special nuclear and byproduct materials, as defined in the Atomic Energy Act of 1954 (AEA), are regulated at the U.S Department of Energy (DOE) facilities exclusively by DOE acting pursuant to its AEA authority. DOE asserts, that pursuant to the AEA, it has sole and exclusive responsibility and authority to regulate source, special nuclear, and byproduct materials at DOE-owned nuclear facilities. Information contained herein on radionuclides is provided for process description purposes only.

This bound document contains a total of 5 sheets.

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PLANT ITEM MATERIAL SELECTION DATA SHEET

Corrosion Considerations:

a General Corrosion
Wilding and Paige (1976) have shown that in 5% nitric acid with 1,000 ppm fluoride at 290°F, the corrosion rate of 304L and 316L can be kept as low as 5 mpy by the use of Al^{+++}. Additionally, Sedriks (1996) has noted with 10% (≈2N) nitric acid and 3,000 ppm fluoride at 158°F, the corrosion rate of 304L and 316L is over 4,000 mpy. The fluoride concentration in this situation is about 900 ppm , the nitric acid concentration is about 0.3 M, and the temperature is 104°F. Based on the available data, the uniform corrosion rate will be small.

Conclusion: At the given conditions, 304L or 316L are both acceptable based on uniform corrosion.

b Pitting Corrosion
Chloride is known to cause pitting in acid and neutral solutions. Phull (2000) has shown that at pH 5, 9,000 ppm chloride, and a temperature of about 122°F, a 6% Mo alloy is satisfactory. In this situation, the pH is significantly lower, as low as 1 rather than 5, but the chloride concentration is also lower, further, there is nitrate present. According to Sedriks (1996), a 6% Mo is acceptable to about 160°F though if the welds are not properly cleaned, the temperature at which pitting initiates can drop to about 85°F. Wilding & Paige (1976) have shown that in 42% nitric acid, concentrations of over 4,000 ppm chloride have no effect on 304L stainless steel. If the effect is assumed linear and if it is assumed 316L can accept twice as much chloride as 304L without a negative effect, then in 0.3 M nitric acid (≈2%), the maximum allowable chloride concentration should be about 400 ppm rather than the 700 ppm present during normal operating conditions.

Conclusion:
It is known that nitrate mitigates the effects of chloride to a degree. Even if the protective effect was linear, more chloride is present and the pH is lower than is acceptable for 316L. Therefore an alloy such as a 6% Mo or equivalent is necessary.

c End Grain Corrosion
End grain corrosion only occurs in metal with exposed end grains and in highly oxidizing acid conditions.

Conclusion:
Not likely in this system.

d Stress Corrosion Cracking
The exact amount of chloride required to cause stress corrosion cracking is unknown In part this is because the amount varies with temperature, metal sensitization, and the environment. But it is also unknown because chloride tends to concentrate under heat transfer conditions, by evaporation, and electrochemically during a corrosion process. Hence, even as little as 10 ppm can lead to cracking under some conditions. Generally, as seen in Sedriks (1996) and Davis (1987), stress corrosion cracking does not usually occur below about 104°F. With the proposed conditions, 316L will not be acceptable. More resistant alloys such as 6% Mo alloys or better will be needed.

Conclusion:
A 6% Mo alloy or better is necessary.

e Crevice Corrosion
Most alloys are expected to be susceptible to crevice corrosion with alloys higher than 300 series stainless steels being less susceptible. See also Pitting.

Conclusion:
See Pitting

f Corrosion at Welds
Other than pitting or crevice corrosion, corrosion at welds is not considered a problem in the proposed environment.

Conclusion:
Weld corrosion is not considered a problem for this system.

g Microbiologically Induced Corrosion (MIC)
The proposed operating conditions are suitable for microbial growth but the system is downstream of the main entry points of microbes.

Conclusion:
MIC is not considered a problem.

h Fatigue/Corrosion Fatigue
Corrosion fatigue is a not expected to be a problem if the piping and nozzles are properly supported.

Conclusions
Not a concern.

PLANT ITEM MATERIAL SELECTION DATA SHEET

i Vapor Phase Corrosion
Vapor phase corrosion is not expected to be a concern

Conclusion.
Not a concern.

j Erosion
Velocities within the vessel are expected to be small .

Conclusion:
Not a concern.

k Galling of Moving Surfaces
Not applicable.

Conclusion
Not applicable.

l Fretting/Wear
No contacting surfaces expected

Conclusion:
Not applicable.

m Galvanic Corrosion
No dissimilar metals are present.

Conclusion:
Not a concern.

n Cavitation
None expected.

Conclusion:
Not believed to be of concern.

o Creep
The temperatures are too low to be a concern.

Conclusion.
Not applicable.

PLANT ITEM MATERIAL SELECTION DATA SHEET

References:

1. Davis, JR (Ed), 1987, *Corrosion, Vol 13*, In "Metals Handbook", ASM International, Metals Park, OH 44073
2 Phull, BS, WL Mathay, & RW Ross, 2000, *Corrosion Resistance of Duplex and 4-6% Mo-Containing Stainless Steels in FGD Scrubber Absorber Slurry Environments*, Presented at Corrosion 2000, Orlando, FL, March 26-31, 2000, NACE International, Houston TX 77218.
3. Sedriks, AJ, 1996, *Corrosion of Stainless Steels*, John Wiley & Sons, Inc., New York, NY 10158
4. Wilding, MW and BE Paige, 1976, *Survey on Corrosion of Metals and Alloys in Solutions Containing Nitric Acid*, ICP-1107, Idaho National Engineering Laboratory, Idaho Falls, ID

Bibliography:

1. Berhardsson, S, R Mellstrom, and J Oredsson, 1981, *Properties of Two Highly corrosion Resistant Duplex Stainless Steels*, Paper 124, presented at Corrosion 81, NACE International, Houston, TX 77218
2. Davis, JR (Ed), 1994, *Stainless Steels*, In ASM Metals Handbook, ASM International, Metals Park, OH 44073
3 Hamner, NE, 1981, *Corrosion Data Survey*, Metals Section, 5th Ed, NACE International, Houston, TX 77218
4 Jones, RH (Ed.), 1992, *Stress-Corrosion Cracking*, ASM International, Metals Park, OH 44073
5 Koch, GH, 1995, *Localized Corrosion in Halides Other Than Chlorides*, MTI Pub No. 41, Materials Technology Institute of the Chemical Process Industries, Inc, St Louis, MO 63141
6 Speidel, MO, 1981, *Stress Corrosion Cracking of Stainless Steels in NaCl Solutions*, Met Trans. A, 12A, 779-789
7. Uhlig, HH, 1948, *Corrosion Handbook*, John Wiley & Sons, New York, NY 10158
8. Van Delinder, LS (Ed), 1984, *Corrosion Basics*, NACE International, Houston, TX 77084

PLANT ITEM MATERIAL SELECTION DATA SHEET
OPERATING CONDITIONS

Materials Selection Data

Component (Name/ID) SBS Condensate Collection Vessel RLD-VSL-0005; RLD-AGT-00002; RLD-PMP-00003A/B
System RLD

Operations

Chemicals	Unit	Cold Startup	Normal Operation*	Contract Max**	Cleaning	Accident
		Note 1	Note 2	Note 3	Note 4	Note 5
Aluminum	g/l		1.06			
Chloride	g/l		0.7	6.09		
Fluoride	g/l		0.91	1.58		
Iron	g/l					
Nitrate	g/l		1.0	4.01		
Nitrite	g/l					
Phosphate	g/l					
TOC[†]	g/l					
Sulfate	g/l		5.92			
Undissolved solids	g/l		11.1			
Particle size/hardness	µm (##)					
Other ($NaMnO_4$, Hg, etc)	g/l			0.013 (Hg)		
Carbonate	g/l					
pH	-		1 to 7.83			
Temperature	°F		104			167 (Note 5)
Velocity	fps					
Vibration						
Time of exposure	#					

* Based on Stream LV220
** Based on Max contract value mass balance, unreleased.
Stream RLD 21

\# - % of total; ## - use Mho scale

Notes:
Note 1: Assume same as Normal minus the radionuclides
Note 2: Stream LV220
Note 3: Based on Max contract value mass balance, unreleased
Note 4: Assume water
Note 5: Based on max SBS operating temperature of 140F plus 27F degrees allowance for offnormal event involving cooling of the SBS

☐ Black Cell

☐ Flushing

[†] List expected organic species:
Use maximum of 2 significant figures

PLANT ITEM MATERIAL SELECTION DATA SHEET

R10170221

RLD-VSL-00003 (LAW)
Plant Wash Vessel

- Design Temperature (°F)(Max/min): 200/-23
- Design Pressure (psig) (max/min): 15/FV
- Location: incell
- Anticipated 40 y radiation dose: gamma <4x10^5 rad, alpha <1.4x10^7 rad

Offspring items

RLD-AGT-00001, RLD-PMP-00001A/B

ISSUED BY
RPP-WTP PDC
11/19/03
INIT DATE

Contents of this document are Dangerous Waste Permit affecting

Operating conditions are as stated on sheet 5

Operating Modes Considered

- Normal operation

Materials Considered:

Material (UNS No.)	Relative Cost	Acceptable Material	Unacceptable Material
Carbon Steel	0.23		X
304L (S30403)	1.00	X	
316L (S31603)	1.18	X	
6% Mo (N08367/N08926)	7.64	X	
Alloy 22 (N06022)	11.4	X	
Ti-2 (R50400)	10.1		X

Material Required: UNS N08367/N08926

Top head: 316 (max 0.030% C; dual certified)

Note: Vessel upgraded to 6% Mo because it will be used as a back-up for RLD-VSL-00005.

Recommended Corrosion Allowance: 0.04 inch

Process & Operations Limitations:

- Develop rinsing/flushing procedure
- Develop lay-up strategy

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EXPIRES: 12/07/03

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PLANT ITEM MATERIAL SELECTION DATA SHEET

Corrosion Considerations:

a General Corrosion
In the proposed pH operating range, no specific information was found for the general/uniform corrosion of stainless steels or other material in the given waste. However, the austenitic and higher alloy steels typically have low corrosion rates, < 1 mpy, in the given environment even at the maximum temperature. This lack of data is not critical because the alloys needed for the system generally fail by pitting, crevice corrosion, or cracking.

Assuming the stated normal operating conditions are correct, 304L will be acceptable with a small uniform corrosion rate.

Conclusion:
Under normal operating conditions, 304L, 316L, or better will be acceptable.

b Pitting Corrosion
Normally the vessel is to operate at 68°F at a pH range of 1 to 7.83 with a minimum of halides. Berhardsson (1981) et al conclude 304L or 316L could be used based on temperatures and stated no-chloride conditions. However, at contract maximum, with high halide concentrations, a 6% Mo would be desirable.

If the vessel were filled with process water and left stagnant, there would be a tendency to pit. The time to initiate would depend on the source of the water, being shorter for filtered river water and longer for DIW. Pitting has been observed in both cases.

Conclusion:
Based on the stated normal operating conditions, 304L and 316L are acceptable.

c End Grain Corrosion
End grain corrosion only occurs in metal with exposed end grains and in highly oxidizing acid conditions.

Conclusion:
Not expected in this system.

d Stress Corrosion Cracking
The exact amount of chloride required to cause stress corrosion cracking is unknown. In part this is because the amount varies with temperature, metal sensitization, and the environment. But it is also unknown because chloride tends to concentrate under heat transfer conditions, by evaporation, and electrochemically during a corrosion process. Hence, even as little as 10 ppm can lead to cracking under some conditions. Generally, as seen in Sedriks (1996) and Davis (1987), stress corrosion cracking does not usually occur below about 104°F. With the proposed conditions, 304L will be acceptable.

Conclusion.
304L is expected to be satisfactory.

e Crevice Corrosion
Few solids are expected under normal conditions and crevice corrosion should be a minimum.

Conclusion:
Also see Pitting

f Corrosion at Welds
Other than pitting or crevice corrosion, corrosion at welds is not considered a problem in the proposed environment.

Conclusion:
Weld corrosion is not considered a problem for this system except as noted above.

PLANT ITEM MATERIAL SELECTION DATA SHEET

g Microbiologically Induced Corrosion (MIC)
The proposed operating conditions are suitable for microbial growth, but the system is downstream of the main entry points of microbes.

Conclusion:
MIC is not considered a problem.

h Fatigue/Corrosion Fatigue
Corrosion fatigue is a not expected to be a problem if the piping and nozzles are properly supported.

Conclusions
Not expected to be a concern.

I Vapor Phase Corrosion
Vapor phase corrosion is not expected to be a concern.

Conclusion:
Not a concern.

j Erosion
Velocity within vessel is sufficiently low as to not be a concern. Furthermore, solids content is low. Because of the low pH, the agitator blade can be Ultimet but it is not considered necessary. Using the same material for the agitator as the vessel is satisfactory.

Conclusion:
Not expected to be a problem.

k Galling of Moving Surfaces
Not applicable.

Conclusion:
Not applicable.

l Fretting/Wear
No contacting surfaces expected.

Conclusion:
Not applicable.

m Galvanic Corrosion
No dissimilar metals are present.

Conclusion:
Not applicable.

n Cavitation
None expected.

Conclusion:
Not believed to be of concern.

o Creep
The temperatures are too low to be a concern for metallic vessels.

Conclusion:
Not applicable.

PLANT ITEM MATERIAL SELECTION DATA SHEET

References:

1. Berhardsson, S, R Mellstrom, and J Oredsson, 1981, *Properties of Two Highly Corrosion Resistant Duplex Stainless Steels*, Paper 124, presented at Corrosion 81, NACE International, Houston, TX 77218
2. Davis, JR (Ed), 1987, *Corrosion, Vol 13*, In "Metals Handbook", ASM International, Metals Park, OH 44073
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1. Agarwal, DC, *Nickel and Nickel alloys*, In: Revie, WW, 2000. *Uhlig's Corrosion Handbook*, 2nd Edition, Wiley-Interscience, New York, NY 10158
2. Davis, JR (Ed), 1994, *Stainless Steels*, In ASM Metals Handbook, ASM International, Metals Park, OH 44073
3. Hamner, NE, 1981, *Corrosion Data Survey*, Metals Section, 5th Ed, NACE International, Houston, TX 77218
4. Jones, RH (Ed.), 1992, *Stress-Corrosion Cracking*, ASM International, Metals Park, OH 44073
5. Koch, GH, 1995, *Localized Corrosion in Halides Other Than Chlorides*, MTI Pub No. 41, Materials Technology Institute of the Chemical Process Industries, Inc, St Louis, MO 63141
6. Phull, BS, WL Mathay, & RW Ross, 2000, *Corrosion Resistance of Duplex and 4-6% Mo-Containing Stainless Steels in FGD Scrubber Absorber Slurry Environments*, Presented at Corrosion 2000, Orlando, FL, March 26-31, 2000, NACE International, Houston TX 77218.
7. Uhlig, HH, 1948, *Corrosion Handbook*, John Wiley & Sons, New York, NY 10158
8. Van Delinder, LS (Ed), 1984, Corrosion Basics, NACE International, Houston, TX 77084
9. Wilding, MW and BE Paige, 1976, *Survey on Corrosion of Metals and Alloys in Solutions Containing Nitric Acid*, ICP-1107, Idaho National Engineering Laboratory, Idaho Falls, ID

PLANT ITEM MATERIAL SELECTION DATA SHEET

OPERATING CONDITIONS

Materials Selection Data

Component (Name/ID) Plant Wash Vessel - RLD-VSL-00003; RLD-AGT-00001; RLD-PMP-00001A/B
System RLD

Operations

Chemicals	Unit	Cold Startup **	Normal Operation*	Contract Max***	Cleaning	Accident
				Note 1	Note 2	Note 3
Aluminum	g/l		0.015			
Chloride	g/l			4.83		
Fluoride	g/l			3.54		
Iron	g/l			6.45		
Nitrate	g/l		0.118	4.31		
Nitrite	g/l		0.039			
Phosphate	g/l					
TOC[⚘]	g/l					
Sulfate	g/l		0.01			
Undissolved solids	g/l		0 05			
Particle size/hardness	μm (##)					
Other (Pb, Hg, Na, etc)	g/l					
Carbonate	g/l					
pH	-		1 to 7.83			14
Dose rate, α, β/γ	Rad		7.09E3, 1 21E7			
Temperature	°F		68			
Velocity	fps					
Vibration						
Time of exposure	#					

* Based on stream LV505, LV220 & LV222/LV222A

\# - % of total; ## - use Mho scale

Remarks: ** Assume same as normal operations minus radionuclides.
*** The Plant wash can receive transfers from the RLD-VSL-00004 and SBS Condensate Collection vessels in off-normal situations.

Notes:

Note 1: Based on max contract value mass balance, unreleased. Assumed worst from streams RLD27, LOP07, RLD21 are all present.
Note 2: Assume water to clean.
Note 3: Based on accident condition pH from RLD-VSL-00004, reduced by heel.

☐ Black Cell

☐ Flushing

⚘ List expected organic species:
Use maximum of 2 significant figures

Attachment 51 – Appendix 9.10
Critical Systems Equipment/Instrument List

Where information regarding treatment, management, and disposal of the radioactive source, byproduct material, and/or special nuclear components of mixed waste (as defined by the Atomic Energy Act of 1954, as amended) has been incorporated into this permit, it is not incorporated for the purpose of regulating the radiation hazards of such components under the authority of this permit and chapter 70.105 RCW. In the event of any conflict between Permit Condition III.10.A. and any statement relating to the regulation of source, special nuclear, and byproduct material contained in portions of the permit application that are incorporated into this permit, Permit Condition III.10.A. will prevail.

Additional appendices will be added to this appendix as new information is incorporated into this permit.

Drawings and Documents

Attachment 51 – Appendix 9.10

Critical Systems Equipment/Instrument List

The following drawings have been incorporated into Appendix 9.10 and can be viewed at the Ecology Richland Office. **New drawings are in bold lettering**.

Drawing/Document Number	**Description**
	LAW Equipment Room List @ El 3 Rev 2
	LAW Equipment Room List @ El -21 Rev 1
RESERVED	RESERVED

LAW El. 3 ft Room and Equipment List, Rev. 02

Room	Room Description	Equipment Number	Equipment Description
L-0109B	Swabbing Area Line #2		No regulated equipment identified
L-0109C	Decontamination Area Line #2		No regulated equipment identified
L-0109D	Inert Fill Line / Welding Area Line #2		No regulated equipment identified
L-0112	LSM GALLERY	LMP-MLTR-00001	LAW Melter
		LMP-MLTR-00002	LAW Melter
L-0115B	Swabbing Area Line #1		No regulated equipment identified
L-0115C	Decontamination Area Line #1		No regulated equipment identified
L-0115D	Inert Fill Line / Welding Area Line #1		No regulated equipment identified
L-0116	Container Export		No regulated equipment identified
L-0116A	Container Export		No regulated equipment identified
L-0119B	Consumable Import / Export		No regulated equipment identified
L-0123	Process Cell	RLD-PMP-00029	Sump Pump
		RLD-PMP-00030	Sump Pump
		LFP-VSL-00001	Melter 1 Feed Preparation Vessel
		LFP-VSL-00002	Melter 1 Feed Vessel
		LCP-VSL-00001	Melter 1 Concentrate Receipt Vessel
		LOP-SCB-00001	Melter 1 Submerged Bed Scrubber (SBS)
		LOP-VSL-00001	Melter 1 SBS Condensate Vessel
		LOP-WESP-00001	Melter 1 Wet Electrostatic Precipitator
L-0124	Process Cell	RLD-PMP-00031	Sump Pump
		RLD-PMP-00032	Sump Pump
		LFP-VSL-00003	Melter 2 Feed Preparation Vessel
		LFP-VSL-00004	Melter 2 Feed Vessel
		LCP-VSL-00002	Melter Concentrate Receipt Vessel
		LOP-SCB-00002	Melter 2 Submerged Bed Scrubber (SBS)
		LOP-VSL-00002	Melter 2 SBS Condensate Vessel
		LOP-WESP-00002	Melter 2 Wet Electrostatic Precipitator

LAW El. 3 ft Room and Equipment List, Rev. 02

Room	Room Description	Equipment Number	Equipment Description
L-0126	Effluent Cell	RLD-PMP-00035	Sump Pump
		RLD-PMP-00036	Sump Pump
		RLD-VSL-00003	Plant Wash Vessel
		RLD-VSL-00005	SBS Condensate Collection Vessel

LAW El. -21 ft Room and Equipment List, Rev. 01

Room	Room Description	Equipment Number	Equipment Description
L-B001B	C3/C5 Drains/Sump Collection Cell	RLD-VSL-00004	C3/C5 Drains/Sump Collection Vessel
		RLD-PMP-00028	Sump Pump
		RLD-BULGE-00001	Bulge
L-B015A	Pour Cave (Melter 1)		No regulated equipment identified
L-B013C	Pour Cave (Melter 1)		No regulated equipment identified
L-B013B	Pour Cave (Melter 2)		No regulated equipment identified
L-B011C	Pour Cave (Melter 2)		No regulated equipment identified
L-B025C	Container Buffer Store		No regulated equipment identified
L-B025D	Container Rework		No regulated equipment identified

Attachment 51 – Appendix 9.11
Low Activity Waste Building
IQRPE Reports

Where information regarding treatment, management, and disposal of the radioactive source, byproduct material, and/or special nuclear components of mixed waste (as defined by the Atomic Energy Act of 1954, as amended) has been incorporated into this permit, it is not incorporated for the purpose of regulating the radiation hazards of such components under the authority of this permit and chapter 70.105 RCW. In the event of any conflict between Permit Condition III.10.A. and any statement relating to the regulation of source, special nuclear, and byproduct material contained in portions of the permit application that are incorporated into this permit, Permit Condition III.10.A. will prevail.

Additional appendices will be added to this appendix as new information is incorporated into this permit.

Drawings and Documents

Attachment 51 – Appendix 9.11

Low Activity Waste Building
IQRPE Reports

The following drawings have been incorporated into Appendix 9.11 and can be viewed at the Ecology Richland Office. **New drawings are in bold lettering.**

Drawing/Document Number	**Description**
24590-101-SC-HXYG-0074-03-00001, Rev 00A	IQRPE Integrity Assessment Report for LCP-VSL-00001/2
24590-CM-HC4-HXYG-00138-01-05, Rev 00D	IQRPE Integrity Assessment Report for RLD-VSL-00004
24590-CM-HC4-HXYG-00138-01-06, Rev A	IQRPE Integrity Assessment Report for Below Grade Secondary Containment
24590-CM-HC4-HXYG-00138-01-09, Rev 00B	IQRPE Integrity Assessment Report for Below Grade RLD Ancillary Equipment
24590-CM-HC4-HXYG-00138-01-10, Rev 00B	IQRPE Integrity Assessment Report for El. 3 Secondary Containment
24590-CM-HC4-HXYG-00138-01-14, Rev 00B	IQRPE Integrity Assessment Report for LCP and RLD Ancillary Equipment
24590-CM-HC4-HXYG-00138-01-19, Rev 00A	IQRPE Integrity Assessment Report for LOP-VSL-00001/2
24590-CM-HC4-HXYG-00138-02-00011, Rev 00A	IQRPE Integrity Assessment Report for LOP-SCB-00001/2 and LOP-WESP-00001/2
24590-CM-HC4-HXYG-00138-02-00018, Rev 00A	IQRP Integrity Assessment Report for El. 28 Secondary Containment
24590-CM-HC4-HXYG-00138-02-00029, Rev 00A	IQRPE Integrity Assessment Report (LFP System) for LFP El. 3 Ancillary Equipment
24590-CM-HC4-HXYG-00138-02-00032, Rev 00A	IQRPE Integrity Assessment Report (LOP System) for El. 3 LOP Ancillary Equipment
24590-CM-HC4-HXYG-00138-02-00038, Rev 00A	IQRPE Integrity Assessment Report (LVP System) for LVP-TK-00001
24590-CM-HC4-HXYG-00138-02-00039, Rev 00A	IQRPE Integrity Assessment Report for El. 3 LOP Miscellaneous Unit Subsystem Equipment
24590-CM-HC4-HXYG-00138-02-00052, Rev 00A	IQRPE Integrity Assessment Report for LVP Ancillary Equipment
24590-CM-HC4-HXYG-00138-02-00053, Rev 00A	IQRPE Integrity Assessment Report LVP System) for LVP Miscellaneous Unit Subsystem Equipment
24590-CM-HC4-HXYG-00138-02-07, Rev 00A	IQRPE Integrity Assessment Report for RLD-VSL-00003/5
CCN 139507 - AREVA-1A-100 Rev. 0	**Structural Integrity Assessment for LAW Melter Feed Process (LFP) System Melter Feed Prep Vessels (LFP-VSL-00001/3) and Melter Feed Vessels (LFP-VSL-00002/4)**
RESERVED	RESERVED

Bechtel National, Inc.

Job No 24590

SUPPLIER DOCUMENT STATUS

1. [X] **Work may proceed.**
2. [ ] **Revise and resubmit. Work may proceed subject to resolution of indicated comments.**
3. [ ] **Revise and resubmit. Work may not proceed.**
4. [ ] **Review not required. Work may proceed.**

Permission to proceed does not constitute acceptance or approval of design details, calculations, analyses, test methods, or materials developed or selected by the supplier and does not relieve supplier from full compliance with contractual obligations.

REVIEWED										ESNS / 1/12

G-321 Document Category N/A
[From Supplement A to G-321-E (E) or G-321-V (V), as applicable, or "N/A" if SSRS is used]

Supersedes BNI Document No. N/A Rev ______
[When applicable]

Accepted by DC Pfluger (Print Name) DC Pfluger (Signature) 1/28/04 (Date)

Released by N/A (Print Name) ______ (Signature) ______ (Date)
[When applicable]

416 GP&S 7-03

24590-101-SC-HXYG-0074-03-00001
REV. 00A

SUBCONTRACT SUBMITTAL

COGEMA-IA-030, Rev. 0

IQRPE REVIEW
OF
THE LOW ACTIVITY WASTE FACILITY CONCENTRATE RECEIPT PROCESS (LCP) SYSTEM VESSELS (LCP-VSL-00001 AND LCP-VSL-00002)

"I, Tarlok S. Hundal, have reviewed and certified a portion of the design of a new tank system or component located at the Hanford Waste Treatment Plant, owned/operated by Department of Energy, Office of River Protection, Richland, Washington. My duties were independent review of the current design for the Low Activity Waste Facility (LAW) Concentrate Receipt Process (LCP) System Vessels (LCP-VSL-00001/2) as required by The Dangerous Waste Regulations, namely, WAC 173-303-640(3) applicable paragraphs [i.e., (a) through (g)]."

"I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment."

The documentation reviewed indicates that the design intent fully satisfies the requirements of the WAC.

The attached review is seven (7) sheets numbered one (1) through seven (7).

TARLOK SINGH HUNDAL
STATE OF WASHINGTON
20213
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES: 02/15/04

T S Hundal
Signature

1/22/04
Date

24590-101-SC-HXYG-0074-03-00001, REV. 00A

STRUCTURAL INTEGRITY ASSESSMENT OF THE LOW ACTIVITY WASTE FACILITY CONCENTRATE RECEIPT PROCESS (LCP) SYSTEM VESSELS (LCP-VSL-00001 AND LCP-VSL-00002)

COGEMA-IA-030
Rev. 0

Scope	Scope of this Integrity Assessment	This integrity assessment includes: Two LCP Concentrate Receipt Vessels : LCP-VSL-00001/2 including their offspring items, located in cells L-0123/L0124 respectively, at Elevation 3'-0" in the LAW Vitrification Building.
References	Specifications, Drawings and Mechanical Data Sheets	The following Specifications are listed in Material Requisition No. 24590-CM-MRA-MVA0-00002, Rev. 1: Engineering Specification for Pressure Vessel Design and Fabrication; Engineering Specification for Seismic Qualification Criteria for Pressure Vessels; Specification for Welding of Pressure Vessels, Heat Exchangers and Boilers; General Specification for Supplier Quality Assurance Program Requirements; Specification for Positive Material Identification (PMI); General Specification for Packing, Shipping, Handling, and Storage Requirements; Engineering Specification for Structural Design Loads for Seismic Category III and IV Equipment and Tanks. Drawings: 24590-LAW-MV-LCP-00001, Rev. 0, Equipment Assembly Concentrate Receipt Vessel (LCP-VSL-00001); 24590-LAW-MV-LCP-00002, Rev. 0, Equipment Assembly Concentrate Receipt Vessel (LCP-VSL-00002); 24590-LAW-P1-P01T-P0002, Rev. 3, LAW Vitrification Building General Arrangement Plan at El. 3'-0"; 24590-LAW-P1-P01T-P0011, Rev. 0, LAW Vitrification Building General Arrangement Section N-N, P-P, R-R, and U-U; 24590-LAW-M5-V17T-P0001, Rev. 0, Process Flow Diagram LAW Melter 1 Receipt & Feed Preparation (System LCP, GFR, and LFP); 24590-LAW-M5-V17T-P0002, Rev. 0, Process Flow Diagram LAW Melter 2 Receipt & Feed Preparation (System LCP, GFR, and LFP); 24590-LAW-M6-LCP-P0001, Rev. 1, P & ID-LAW Concentrate Receipt Process System Concentrate Receipt Vessel, VSL-00001; 24590-LAW-M6-LCP-P0002, Rev. 1, P & ID-LAW Concentrate Receipt Process System Concentrate Receipt Vessel, VSL-00002. Mechanical Data Sheets: 24590-LAW-MVD-LCP-00004, Rev.0, Concentrate Receipt Vessel (LCP-VSL-00001); 24590-LAW-MVD-LCP-00005, Rev.0, Concentrate Receipt Vessel (LCP-VSL-00002).
Summary of Assessment		For each item of "Information Assessed" (i.e., Criteria) on the following pages, the items listed under "Source of Information" were reviewed and found to furnish adequate design controls and requirements to ensure the design intent fully satisfies the requirements of Washington Administrative Code, WAC-173-303-640, *Dangerous Waste Regulations*.

	Information Assessed	Source of Information	Assessment
Design	Vessel design standards are appropriate and adequate for the vessel's intended use.	Specifications listed under Material Requisition, Drawings, and Mechanical Data Sheets listed above under References; 24590-LAW-3YD-LCP-00001, Rev. 0, System Description for LAW Concentrate Receipt Process (LCP); SDCN No. 24590-LAW-3YN-LCP-00001, System Description for LAW Concentrate Receipt Process (LCP).	The LCP system Concentrate Receipt Vessels, LCP-VSL-00001/2 and all offspring items are to be designed to the ASME Section VIII, Division 1 rules which are appropriate for pressure vessels operating with mixed waste solutions over the pressure and temperature ranges specified for these vessels. Supplementary requirements are specified in the Engineering Specification for Pressure Vessel Design and Fabrication. Supplementary requirements address pressure vessel, positive material identification, lifting attachment design, equipment drop evaluation, fabrication tolerances, acceptable welding procedures for the vessel and appurtenances, welder qualifications and testing records, NDE inspections and records, and lifting, packaging, shipping, handling and storage requirements. These are adequate and acceptable design standards. The LAW Concentrate Receipt Vessels, LCP-VSL-00001/2 are vertical vessels with a 168 in. ID and a height of 153 in. from bottom tangent line to top tangent line. The vessel's top and bottom Flanged & Dished (F & D) heads are built with minimum 1" thick plate (top head) and ¾ " thick plate (bottom head). The shell is specified to be made of 3/4" minimum thick plate. Each vessel is supported on a cylindrical skirt (1/2" thick by approx. 2'-9" high) which in turn is supported on a base plate anchored to the concrete floor at Elev. 2'-0". The vessel has internal equipment such as an agitator, pump, and spray nozzles that are supported from the vessel's top. Material for the shell, top and bottom heads, and vessel's internal equipment is SA-240 316 stainless steel (0.030% maximum carbon content, dual certified). The supporting skirt is specified as SA-240 304 stainless steel (0.030% maximum carbon content, dual certified). Both preceding listed stainless steel materials will hereafter be referred to as 316 and 304, respectively. The operating volume is to be about 15,400 gallons and the total internal volume is to be about 18,100 gallons.

	Information Assessed	Source of Information	Assessment
Design	If a non-standard vessel is to be used, the design calculations demonstrate sound engineering principles of construction.	Specifications listed under Material Requisition, Drawings, and Mechanical Data Sheets listed above under References; 24590-CM-MRA-MVA0-00002-S01, Rev.001, Material Requisition Supplement; 24590-CM-MRA-MVA0-00002-S02, Rev.001, Material Requisition Supplement; 24590-CM-MRA-MVA0-00002-S03, Rev.001, Material Requisition Supplement; 24590-CM-MRA-MVA0-00002-S04, Rev.001, Material Requisition Supplement; 24590-CM-MRA-MVA0-00002-S05, Rev.001, Material Requisition Supplement; 24590-CM-MRA-MVA0-00002-S06, Rev.001, Material Requisition Supplement; 24590-CM-MRA-MVA0-00002-S07, Rev.001, Material Requisition Supplement; 24590-CM-MRA-MVA0-00002-S08, Rev.001, Material Requisition Supplement; 24590-CM-MRA-MVA0-00002-S09, Rev.001, Material Requisition Supplement.	The LCP Concentrate Receipt Vessels, LCP-VSL-00001/2 are standard ASME Section VIII vessels. The Mechanical Data Sheets require that the ASME Section VIII, Division 1 vessels be delivered after design, fabrication, inspection and testing with an ASME code stamp and that the vessels be nationally registered. Supplemental design information is provided by the reference documents listed in the Source of Information column for utilizing sound engineering principles of construction of the vessels. As discussed above, the vessel design standards are appropriate and adequate for the vessel's intended use.

	Information Assessed	Source of Information	Assessment
Design	Vessel has adequate strength, after consideration of the corrosion allowance, to withstand the operating pressure, operating temperature, and seismic loads.	Specifications listed under Material Requisition, Drawings, and Mechanical Data Sheets listed above under References; 24590-LAW-3YD-LCP-00001, Rev. 0, System Description for LAW Concentrate Receipt Process (LCP); SDCN No. 24590-LAW-3YN-LCP-00001, System Description for LAW Concentrate Receipt Process (LCP).	The Mechanical Data Sheets identify the vessel's operating pressure and temperature ranges, the materials selected for the vessel, the corrosion allowance(s), and the vessel quality level which determines the requirements for seismic design. The design specification for the vessel requires specific consideration of the operating pressures and temperatures and seismic loads in the design process. ASME Section VIII, Div. 1 requires that corrosion allowance thickness shall be excluded from nominal vessel thickness when evaluating the adequacy of vessel components for these loads at end of life. The Engineering Specification for Seismic Qualification Criteria for Pressure Vessels adopts ASME Section VIII, Div. 2 design rules to address seismic design and analysis of the vessel and ASME Section VIII, Div.1 for vessel supports. Detailed requirements for seismic load determination are furnished in the specification for Seismic Category III/IV Equipment and Tanks. These codes and standards are adequate and appropriate for design of the LCP vessel to withstand operating pressure and temperature loads and seismic loads for the specified design life.

	Information Assessed	Source of Information	Assessment
Foundation	Vessel foundation will maintain the load of a full vessel.	Specifications listed under Material Requisition above under References; 24590-WTP-DB-ENG-01-001, Rev. 1A, Basis of Design.	The Engineering Specification for Pressure Vessel Design and Fabrication requires the use of ASME BPV Code, Section VIII, Division 1 for design of the vessel supports. This code ensures an adequate design for the vessel supports. Chapter 14 of the Basis of Design document requires that vessel foundations design must be adequate to support the loads from full vessels.
	If in an area subject to flooding, the vessel is anchored.	Specifications listed under Material Requisition under References.	Buoyant forces of an empty vessel in a flooded room are a mandatory standard design load case in the Specification for Pressure Vessel Design and Fabrication.
	Vessel system will withstand the effects of frost heave.	24590-WTP-DB-ENG-01-001, Rev. 1A, Basis of Design.	The Basis of Design document requires that all structural foundations extend a distance below grade that exceeds the depth of the frost line. The vessel is located inside/interior of the building at above grade (Elevation 3'-0" level), therefore, the vessel foundation is not subject to frost heave.

	Information Assessed	Source of Information	Assessment
Waste Characteristics	Characteristics of the waste to be stored or treated have been identified (ignitable, reactive, toxic, specific gravity, vapor pressure, flash point, storage temperature)	Mechanical Data Sheets listed above under References; Plant Item Material Selection Data Sheet, 24590-LAW-N1D-LCP-P0001, Rev. 0, LCP-VSL-00001/2 (LAW) Concentrate Receipt Vessels ; 24590-WTP-PSAR-ESH-01-002-03, Rev. 1, Preliminary Safety Analysis Report to Support Construction Authorization: LAW Facility Specific Information; WA7890008967, *Dangerous Waste Portion of the Hanford Facility Resource Conservation and Recovery Act Permit for the Treatment, Storage, and Disposal of Dangerous Waste,* Chapter 10, and Attachment 51, " Waste Treatment and Immobilization Plant."	The Mechanical Data Sheets present the waste specific gravity, storage temperatures and pressures. The Plant Item Material Selection Data Sheet addresses the pH range and chemical composition of the waste to select appropriate vessel materials and specify the corrosion allowance. Other waste characteristics that are hazardous, such as ignitability, reactivity, and toxicity are addressed by the Preliminary Safety Analysis Report for the LAW Vitrification Building and in Part A of the Permit as an integral part of the design process. The LCP vessels provide primary confinement of the waste during normal operations, abnormal operations and during and after a Design Basis Earthquake. Each vessel has a continually operating agitator for waste mixing and each vessel is actively vented via LAW vent system to prevent any build-up of flammable gases. The vessels are grounded to control ignition sources.
	Vessel is designed to store or treat the wastes with the characteristics defined above and any treatment reagents.	Plant Item Material Selection Data Sheet, 24590-LAW-N1D-LCP-P0001, Rev. 0, LCP-VSL-00001/2 (LAW) Concentrate Receipt Vessels ; 24590-LAW-3YD-LCP-00001, Rev. 0, System Description for LAW Concentrate Receipt Process (LCP); SDCN No. 24590-LAW-3YN-LCP-00001, System Description for LAW Concentrate Receipt Process (LCP).	The Plant Item Material Selection Data Sheet demonstrates that the vessel is designed to process the wastes discussed above. The System Description discusses normal and abnormal operations for the LCP vessels. Compatible fluids (acid or water) will be used for flushing/rinsing or wash downs.
	The waste types are compatible with each other.	24590-LAW-3YD-LCP-00001, Rev. 0, System Description for LAW Concentrate Receipt Process (LCP); SDCN No. 24590-LAW-3YN-LCP-00001, System Description for LAW Concentrate Receipt Process (LCP).	The System Description for the LAW (LCP) does not describe any operations where incompatible wastes are mixed in these vessels for processing. The LCP system is the beginning of the LAW vitrification process. The LCP vessels function primarily to receive LAW concentrate waste from the Pretreatment (PT) plant. The waste is stored and sampled to confirm the glass forming recipe before transferring it to the Melter Feed Preparation vessels for further processing to produce a vitrified product.

	Information Assessed	Source of Information	Assessment
Corrosion Protection	Vessel material and protective coatings ensure the vessel structure is adequately protected from the corrosive effects of the waste stream and external environments (expected to not leak or fail for the design life of the system)	Drawings and Mechanical Data Sheets listed above under References; Plant Item Material Selection Data Sheet; 24590-LAW-N1D-LCP-P0001, Rev. 0, LCP-VSL-00001/2 (LAW) Concentrate Receipt Vessels ; 24590-LAW-3YD-LCP-00001, Rev. 0, System Description for LAW Concentrate Receipt Process (LCP); SDCN No. 24590-LAW-3YN-LCP-00001, System Description for LAW Concentrate Receipt Process (LCP).	The Plant Item Material Selection Data Sheet shows that the LAW Concentrate Receipt Vessels, LCP-VSL-00001/2 normally operate at a pH of 14.5, and at a temperature of 113°F. The vessel is designed for 15 psig pressure and a temperature of 150°F. Other pertinent vessel operation and design information is provided in the Mechanical Data Sheets. Potential acid cleaning operations of the vessel were also considered. The materials selected are 316 and 304 and a corrosion allowance of 0.04 in. The LCP vessels are located in the LAW cells (L-0123/L-0124) at elevation 3'-0". The vessel's support skirt material is 304. This cell is equipped with a sump to pump out any leaks. Therefore, the cell should remain dry during normal operations which will limit external corrosion of the vessel over the facility design life.
Corrosion Allowance	Corrosion allowance is adequate for the intended service life of the vessel.	Mechanical Data Sheets listed above under References; Plant Item Material Selection Data Sheet; 24590-LAW-N1D-LCP-P0001, Rev. 0, LCP-VSL-00001/2 (LAW) Concentrate Receipt Vessels.	The bases for the LCP vessel's material selection and corrosion allowance are furnished in the Plant Item Material Selection Data Sheet. Selection of 316 and 304 materials with a corrosion allowance of 0.04 in. for a service life of 40 years is adequate and appropriate. The material selections and corrosion allowances are carried forward to the Mechanical Data Sheets, consistently and correctly.
Pressure Relief	Pressure controls (vents and relief valves) are adequately designed to ensure pressure relief if normal operating pressures in the vessel are exceeded.	Drawings listed above under References; 24590-LAW-3YD-LCP-00001, Rev. 0, System Description for LAW Concentrate Receipt Process (LCP); SDCN No. 24590-LAW-3YN-LCP-00001, System Description for LAW Concentrate Receipt Process (LCP).	The LCP Concentrate Receipt Vessels , LCP-VSL-00001/2 are designed with an unrestricted overflow through a 6" diameter line to the C3/C5 Drains/Sump Collection Vessel (RLD-VSL-00004) located at Elevation (-) 21'-0", as shown on the drawings and described in the System Description document. The vessels are also connected to the LAW vessel vent system to prevent their over pressurization.

COGEMA ENGINEERING

RECEIVED
JAN 2 2 2004
BNI-Subcontracts

January 22, 2004

COGEMA-04-0023

D. J. Whiting
Bechtel National, Inc.
Waste Treatment Plant
2435 Stevens Center
Richland, Washington 99352

Dear Ms. Whiting:

BECHTEL NATIONAL, INC. CONTRACT NO. 24590-CM-HC4-HXYG-00138 - STRUCTURAL INTEGRITY ASSESSMENT OF THE LOW ACTIVITY WASTE FACILITY CONCENTRATE RECEIPT PROCESS (LCP) SYSTEM VESSELS (LCP-VSL-00001 AND LCP-VSL-00002)

The integrity assessment has been completed per the contract requirements and is enclosed for your use. The assessment found the design intent is sufficient to ensure the vessel(s) will be adequately designed and will have sufficient structural strength, compatibility with the waste(s) to be stored or treated, and corrosion protection to ensure that they will not collapse, rupture, or fail.

If you have any questions, please contact me at (509) 376-5445, or via facsimile at (509) 372-0504.

Sincerely,

K V Scott

K. V. Scott, Manager
Facilities, Structures & Components

llm

Enclosure

cc: D. C. Pfluger w/ Enclosure

Bechtel Systems & Infrastructure, Inc.

JOB No. 24590

SUPPLIER DOCUMENT STATUS
1. ☒ WORK MAY PROCEED
2. ☐ REVISE AND RESUBMIT. WORK MAY PROCEED SUBJECT TO RESOLUTION OF INDICATED COMMENTS
3. ☐ REVISE AND RESUBMIT. WORK MAY NOT PROCEED
4. ☐ REVIEW NOT REQUIRED. WORK MAY PROCEED.

PERMISSION TO PROCEED DOES NOT CONSTITUTE ACCEPTANCE OR APPROVAL OF DESIGN DETAILS, CALCULATIONS, ANALYSES, TEST METHODS, OR MATERIALS DEVELOPED OR SELECTED BY THE SUPPLIER AND DOES NOT RELIEVE SUPPLIER FROM FULL COMPLIANCE WITH CONTRACTUAL OBLIGATIONS.

	M	P	ML	H	MH	E	C&I	CS&A	PD	PT	ESH
REVIEWED											HM

G-321 DOCUMENT CATEGORY N/A

[From Supplement A to G-321-E (E) or G-321-V (V), as applicable]

RESPONSIBLE ENGINEER [signature] DATE 4/8/03

24590-CM-HC4-HXYG-00138-01-05
REV. 00D

SUBCONTRACT SUBMITTAL

4/8/03

☒ Processed/ Data Entry ☒ Copied/ QA ☐ Scanned ☐ Filed

4-8-03 WB

COGEMA ENGINEERING

R10029986

STRUCTURAL INTEGRITY ASSESSMENT OF THE LOW ACTIVITY WASTE BELOW GRADE RADIOACTIVE LIQUID WASTE DISPOSAL SYSTEM TANK, REVISION 4

"I, Michael L. Vosk have reviewed, and certified a portion of the design of a new tank system or component located at the Hanford Waste Treatment Plant, owned/operated by Department of Energy, Office of River Protection, Richland, Washington. My duties were independent review of the current design for the Low Activity Waste Below Grade Radioactive Liquid Waste Disposal System Tank as required by The Dangerous Waste Regulations, namely, WAC 173-303-640(3) (applicable paragraphs [i.e., (a) through (g)]."

"I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment."

The documentation reviewed indicate that the design intent fully satisfies the requirements of the WAC.

The attached review is 5 sheets numbered 1 through 5.

MICHAEL L. VOSK
STATE OF WASHINGTON
38908
REGISTERED PROFESSIONAL ENGINEER
4-4-03
EXPIRES: 9-11-03

Signature　　　　4-4-03
Date

24590-LAW-HCU-HX46-00138-01-05
Rev 00D

(1)

COGEMA ENGINEERING

STRUCTURAL INTEGRITY ASSESSMENT OF THE WASTE TREATMENT AND IMMOBILIZATION PLANT

LOW ACTIVITY WASTE BELOW GRADE RADIOACTIVE LIQUID WASTE DISPOSAL SYSTEM TANK

COGEMA-IA-005
REV. 4

2

Low Activity Waste Below Grade Radioactive Liquid Waste Disposal System Tank			COGEMA-IA-005, Rev. 4
Information assessed	Y/N	Source of Information	Assessment
Tank design standards are appropriate and adequate for the tank's intended use.	Y	24590-LAW-MV-RLD-P0001, Rev. 1, EQUIPMENT ASSEMBLY C3/C5 DRAINS/SUMP COLLECTION VESSEL RLD-VSL-00004; MECHANICAL DATA SHEET: VESSEL, 24590-LAW-MVD-RLD-P0001, Rev. 1, 3C3/C5 Drains/Sump Collection Vessel RLD-VSL-00004;; 24590-WTP-3PS-MV00-TP001, Rev. 0, Engineering Specification for Pressure Vessel Design and Fabrication.	The Engineering Specification for Pressure Vessel Design and Fabrication requires that the Low Activity Waste (LAW) C3/C5 Drains/Sump Collection Vessel RLD-VSL-00004 and all tank appurtenances be designed to ASME Section VIII, Division 1 rules. These rules are appropriate for an unfired pressure vessel operating with mixed waste solutions over the pressure and temperature range specified for this vessel. Supplementary requirements are specified in the Engineering Specification for Pressure Vessel Design and Fabrication. These supplementary requirements address positive material identification, standard fabrication tolerances, acceptable welding procedures for the tank and appurtenances, welder qualifications and testing records, NDE inspections and records, quality assurance requirements, and packaging, shipping, handling and storage requirements . These are acceptable codes and standards. The LAW RLD tank (RLD-VSL-00004) is a vertical tank with a 120 in. ID and a vertical length of 132 in. tangent to tangent supported on a cylindrical skirt. Top and bottom heads are torispherical with straight flanges. The shell and heads are to have a minimum thickness of 1/2 inch. Materials for the shell, head and appurtenances are to be SA-240 316L stainless steel (maximum Carbon 0.030%, dual certified). The lower head is to have a 0.125 in. minimum explosion-bonded internal clad layer of SB-443 Inconel 625 to improve corrosion resistance. The operating volume is to be about 6510 gallons and the total internal volume is to be about 7696 gallons.

Information assessed	Y/N	Source of Information	Assessment
If a non-standard tank is to be used, the design calculations demonstrate sound engineering principles of construction.	N/A	24590-WTP-3PS-MV00-TP001, Rev. 0, Engineering Specification for Pressure Vessel Design and Fabrication.	The Engineering Specification for Pressure Vessel Design and Fabrication requires that the ASME Section VIII, Division 1 vessel be delivered after design, fabrication, inspection and testing with an ASME U stamp and that the tank be registered with the National Board. It is a shop fabricated tank for mixed waste service in the Low Activity Waste Building. As discussed in the item immediately above, the tank design standards are appropriate and adequate for the tank's intended use.
Tank has adequate strength, after consideration of the corrosion allowance, to withstand the operating pressure, operating temperature, and seismic loads.	Y	24590-WTP-3PS-MV00-TP001, Rev. 0, Engineering Specification for Pressure Vessel Design and Fabrication; 24590-WTP-3PS-MV00-TP002, Rev. 1, Engineering Specification for Seismic Qualification Criteria for Pressure Vessels; 24590-WTP-3PS-FB01-T0001, Rev. 0, Engineering Specification for Structural Design Loads for Seismic Category III and IV Equipment and Tanks; MECHANICAL DATA SHEET: VESSEL, 24590-LAW-MVD-RLD-P0001, Rev. 1, 3C3/C5 Drains/Sump Collection Vessel RLD-VSL-00004; Drawing No. 24590-LAW-MV-RLD-P0001, Rev. 1, EQUIPMENT ASSEMBLY C3/C5 DRAINS/SUMP COLLECTION VESSEL RLD-VSL-00004.	The Engineering Specification for Pressure Vessel Design and Fabrication requires specific consideration of the operating pressures, temperatures, seismic loads and the corrosion allowance in the design process. Supplementary design criteria are specified in the Engineering Specifications for Seismic Qualification Criteria for Pressure Vessels and Structural Design Loads for Seismic Category III and IV Equipment and Tanks to provide for the seismic design analysis. The Mechanical Data Sheet identifies the tank operating pressure and temperature ranges, the materials selected for the tank, the design corrosion allowance for a 40 year service life, and the requirements for seismic qualification of the vessel. The Equipment Assembly drawing specifies a minimum thickness for the tank primary shell and heads of 1/2 in. stainless steel.
Tank foundation will maintain the load of a full tank.	Y	Drawing No. 24590-LAW-MV-RLD-P0001, Rev. 0, EQUIPMENT ASSEMBLY C3/C5 DRAINS/SUMP COLLECTION VESSEL RLD-VSL-00004; 24590-WTP-3PS-MV00-TP001, Rev. 0, Engineering Specification for Pressure Vessel Design and Fabrication.	The specification for Pressure Vessel Design and Fabrication requires the use of ASME Section VIII, Division 1 rules for design of vessel supports. These requirements are appropriate and adequate to ensure that the tank foundation can support the loads of a full tank.
If in an area subject to flooding, the tank is anchored.	Y	24590-WTP-3PS-MV00-TP001, Rev. 0, Engineering Specification for Pressure Vessel Design and Fabrication.	Buoyant forces of an empty tank in a flooded room are a standard design load case in this design and fabrication specification for pressure vessels.

Low Activity Waste Below Grade Radioactive Liquid Waste Disposal System Tank			COGEMA-IA-005, Rev. 4
Information assessed	Y/N	Source of Information	Assessment
Tank system will withstand the effects of frost heave.	Y	24590-LAW-3YD-20-00001, Rev. 0, Systems RLD and NLD LAW Vitrification Liquid Effluent System Description.	This tank is located in a shielded concrete cell at elevation (-) 21'-0" below the first floor of the Low Activity Waste Building. This location is below the annual frost line.
Characteristics of the waste to be stored or treated have been identified (ignitability, reactivity, toxicity, pH range, specific gravity, vapor pressure, flash point, storage temperature).	Y	Drawing No. 24590-LAW-MV-RLD-P0001, Rev. 1, EQUIPMENT ASSEMBLY C3/C5 DRAINS/SUMP COLLECTION VESSEL RLD-VSL-00004; MECHANICAL DATA SHEET: VESSEL, 24590-LAW-MVD-RLD-P0001, Rev. 1, 3C3/C5 Drains/Sump Collection Vessel RLD-VSL-00004; VESSEL/TANK MATERIAL SELECTION DATA SHEET, 24590-LAW-N1D-RLD-P0001, Rev. 1, RLD-VSL-00004 (LAW) C3/C5 Drains/Sump Collection Vessel; 24590-LAW-3YD-20-00001, Rev. 0, Systems RLD and NLD LAW Vitrification Liquid Effluent System Description. 24590-WTP-PSAR-ESH-01-002-03, Rev 0, Preliminary Safety Analysis Report to Support Construction Authorization; LAW Facility Specific Information	Design specific gravity 1.47, Operating temperature 158 °F, Vessel design temperature 183 °F, Internal operating pressure Atmospheric, Internal design pressure 15 psig, External operating pressure 0.6 psig, External vessel design condition full vacuum in the tank with external pressure of one atmosphere. The LAW RLD tank (RLD-VSL-00004) continuously collects the purge liquid from the Wet Electrostatic Precipitators in the LAW Melters offgas system and any wash discharges from the C3/C5 areas floor drains in the LAW facility. Vessel RLD-VSL-00004 is actively ventilated by the vessel vent system to prevent build-up of flammable gases. The tank is furnished with a grounding lug to control the discharge of static electricity and preclude ignition sources inside the tank. The Vessel/Tank Material Selection Data Sheet indicates that RLD-VSL-00004 will operate in a pH range of 0.71 to 1.57. The system description for the RLD Liquid Effluent System indicates that the RLD vessel and associated piping do not provide important to safety functions. The Preliminary Safety Analysis Report (PSAR) provides a summary of potential hazardous conditions associated with each LAW Facility vessel and the design provisions that are to be used to provide adequate control of each hazard. These hazards range from radioactive liquid spills to criticality.

5

Low Activity Waste Below Grade Radioactive Liquid Waste Disposal System Tank			COGEMA-IA-005, Rev. 4
Information assessed	Y/N	Source of Information	Assessment
Tank is designed to store or treat the wastes with the characteristics defined above and any treatment reagents.	Y	24590-LAW-3YD-20-00001, Rev. 0, Systems RLD and NLD LAW Vitrification Liquid Effluent System Description. 24590-WTP-PSAR-ESH-01-002-03, Rev 0, Preliminary Safety Analysis Report to Support Construction Authorization; LAW Facility Specific Information	As noted in the adjacent entry above, tank RLD-VSL-00004 is designed to store and transfer the waste and treatment reagents (if any) that it receives. Also as noted above, the Preliminary Safety Analysis (PSAR) identifies the potential hazards associated with the Liquid Effluent System. The PSAR also identifies design provisions for control of the identified credible hazards.
The waste types are compatible with each other.	Y	24590-LAW-3YD-20-00001, Rev. 0, Systems RLD and NLD LAW Vitrification Liquid Effluent System Description.	All sources of waste streams for RLD-VSL-00004 are discussed in the System Description, both normal and upset flows. The System Description notes that neutralization of vessel contents is not planned for the LAW RLD tank because these operations are normally conducted in the Pretreatment Facility.
Tank material and protective coatings ensure the tank structure is adequately protected from the corrosive effects of the waste stream and external environments (expected to not leak or fail for the design life of the system).	Y	VESSEL/TANK MATERIAL SELECTION DATA SHEET, 24590-LAW-N1D-RLD-P0001, Rev. 1, RLD-VSL-00004 (LAW) C3/C5 Drains/Sump Collection Vessel; MECHANICAL DATA SHEET: VESSEL, 24590-LAW-MVD-RLD-P0001, Rev. 1, 3C3/C5 Drains/Sump Collection Vessel RLD-VSL-00004.	The materials selected for the tank in the Vessel/Tank Material Selection Data Sheet are the materials listed in the Mechanical Data Sheet. The tank primary boundary, shell and heads, and all internals are to be SA-240 316L stainless steel (maximum Carbon 0.030%, dual certified). The bottom tank head is to be internally clad with a minimum of 0.125in. of SB-443 Inconel 625 Nickel-Chromium sheet to protect it from under-deposit corrosion. The Vessel/Tank Material Selection Data Sheet determined that the inclusion of the internal clad on the lower head is an adequate design feature to control pitting and stress corrosion cracking mechanisms. A corrosion allowance of 0.04 inches is specified for a 40 year service life for this tank.
Corrosion allowance is adequate for the intended service life of the tank.	Y	VESSEL/TANK MATERIAL SELECTION DATA SHEET, 24590-LAW-N1D-RLD-P0001, Rev. 1, RLD-VSL-00004 (LAW) C3/C5 Drains/Sump Collection Vessel; MECHANICAL DATA SHEET: VESSEL, 24590-LAW-MVD-RLD-P0001, Rev. 1, 3C3/C5 Drains/Sump Collection Vessel RLD-VSL-00004.	The uniform corrosion allowance of 0.040 inches for a 40 year tank life is adequate for the process conditions discussed in the Vessel/Tank Material Selection Data Sheet. This corrosion allowance is provided in the Mechanical Data Sheet for RLD-VSL-00004 so that it will be incorporated into the vessel design and fabrication. The materials chosen, welding processes selected, surface preparation, and preservice inspections are appropriate for the anticipated service conditions.

Low Activity Waste Below Grade Radioactive Liquid Waste Disposal System Tank			COGEMA-IA-005, Rev. 4
Information assessed	Y/N	Source of Information	Assessment
Pressure controls (vents and relief valves) are adequately designed to ensure pressure relief if normal operating pressures in the tank are exceeded.	Y	Drawing No. 24590-LAW-MV-RLD-P0001, Rev. 1, EQUIPMENT ASSEMBLY C3/C5 DRAINS/SUMP COLLECTION VESSEL RLD-VSL-00004; 24590-LAW-3YD-20-00001, Rev. 0, Systems RLD and NLD LAW Vitrification Liquid Effluent System Description.	The LAW RLD tank (RLD-VSL-00004) is the final receiver tank for the overflow systems of tanks in the LAW Building handling radioactive liquid effluent materials as discussed in the System Description. The tank is equipped with a 8-in. diameter overflow line with no obstructions as shown on the Assembly drawing that drains to the liner floor and sump in the vault where the tank is located. The overflow line is the larger than the inlet lines entering the tank from the C3/C5 building areas This tank is also designed to handle the maximum expected 30 minute firewater volume for a single fire in any of the contaminated C3/C5 areas in the building by overflowing to the secondary containment which is sized to handle this volume.
ID = Internal Diameter OD = Outside Diameter N/A = Not Applicable psig = pounds per square inch gage Y = Yes N = No			

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COGEMA-03-0119

T. A. O'Toole
Bechtel National, Inc.
Waste Treatment Plant
2435 Stevens Center
Richland, Washington 99352

Dear Ms. O'Toole:

STRUCTURAL INTEGRITY ASSESSMENT OF THE LOW ACTIVITY WASTE BELOW GRADE RADIOACTIVE LIQUID WASTE DISPOSAL SYSTEM TANK, REVISION 4

The integrity assessment has been completed per the contract requirements and is attached for your use. The assessment found the design intent is sufficient to ensure the vessel will be adequately designed and will have sufficient structural strength, compatibility with the waste(s) to be stored or treated, and corrosion protection to ensure that it will not collapse, rupture, or fail.

If you have any questions, please contact me at (509) 376-5445, or via facsimile at (509) 372-0504.

Sincerely,

K V Scott

K. V. Scott, Manager
Facilities, Structures & Components

kld

Attachment

cc: D. C. Pfluger w/ attachment

8

MASTER DISTRIBUTION SCHEDULE

Project Name: RPP-WTP

Document Distribution: 24590-CM-HC4-HXYG-00138

Document Number: **Revision:**

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Dan Pfluger	MS4-E2							LEAD REVIEWER
Brad Erlundson								Reviewer
Trisha O'Toole								Info

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DAN PFLUGER
Approver's Name (Print)

[signature]
Approver's Signature

8/27/2007
Date

9

Bechtel Systems
&
Infrastructure, Inc.

JOB No 24590

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G-321 DOCUMENT CATEGORY
[From Supplement A to G-321-E (E) or G-321-V (V) as applicable]
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IQRPE REVIEW – LOW ACTIVITY WASTE BELOW GRADE SECONDARY CONTAINMENT

"I, John T. Baxter have reviewed, and certified a portion of the design of a new tank system or component located at the Hanford Waste Treatment Plant, owned/operated by Department of Energy, Office of River Protection, Richland, Washington. My duties were independent review of the current design for the Low Activity Waste Below Grade Secondary Containment as required by the Dangerous Waste Regulations, namely, WAC 173-303-640(3) (applicable paragraphs (i.e., (a) through (g))."

"I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment."

The documentation reviewed indicate that the design intent fully satisfies the requirements of the WAC.

The attached review is 5 sheets numbered 1 through 5.

JOHN T. BAXTER
STATE OF WASHINGTON
18978
REGISTERED PROFESSIONAL ENGINEER
EXPIRES: 10/28/ 04

John T. Baxter

Signature — Date: September 12, 2002

24590-CM-HC4-HX4G-00138-01-06A

STRUCTURAL INTEGRITY ASSESSMENT OF THE WASTE TREATMENT AND IMMOBILIZATION PLANT

LOW ACTIVITY WASTE BELOW GRADE SECONDARY CONTAINMENT

COGEMA-IA-007
REV. 1

24590-CM-HC4-HX4G-00138-01-06A

	Information Assessed	Y/N	Source of Information	Assessment
Tank Foundation	Description of subsurface conditions and soil bearing capacity are adequate.	Y	Engineering Specifications: 24590-BOF-3PS-C000-T0001, Rev. 1, Material Testing Services; 24590-BOF-3PS-CE01-T0001, Rev. 2, Excavation and Backfill; 24590-WTP-DC-ST-01-001, Rev. 0, Structural Design Criteria	The secondary containment associated with the LAW C3/C5 Drain/Sump Collection Vessel (RLD-VSL-00004) in cell L-B001B, and associated sump RLD-SUMP-00028 are included in this assessment. NOTE: Process Bulge Secondary containment is addressed under ancillary equipment. The Structural Design Criteria adequately presents design guidance for both mat and spread footings based on the geotechnical site investigation for the facility (H-1616-51, Shannon & Wilson, 2000). Bearing capacity and settlement design parameters are furnished for the dense Hanford Upper and Lower Sand Units and Structural Fill. Use of the loose wind blown (dune) sands for foundations is precluded. The Excavation and Backfill specification provides structural backfill requirements based on the geotechnical report and adequate current codes and standards for selection, placing, and compacting structural backfill including testing of candidate fill materials and completed backfills. The Specification for Material Testing Services provides current adequate codes and standards for testing of candidate structural fill materials and in-situ testing of structural fills as they are constructed. The codes and standards are consistent with those called out in the Excavation and Backfill specification.
	Foundation design loads (including full tanks) and estimated settlement are adequately considered	Y	24590-WTP-DC-ST-01-001, Rev. 0, Structural Design Criteria	The Structural Design Criteria uses current adequate standards to define design loads and load combinations (ASCE 7-98, ACI 349-01, ACI 349R-01). Dead and Fluid loads are included in these loads and load combinations. Settlement design parameters are included in the Structural Design Criteria subsection on geotechnical parameters and foundation design.
	Design calculation approach and design basis of footings with design standard references (e.g., ACI) are adequate	Y	24590-WTP-DC-ST-01-001, Rev. 0, Structural Design Criteria; RPT-W375-RU00002, Issue 2, TWRS-P Facility Design Basis Earthquake - Peak Ground Acceleration, Seismic Response Spectra, and Seismic Design Approach; 24590-WTP-DB-ENG-01-001, Rev. 0, Basis of Design.	The Structural Design Criteria references current adequate design criteria for the design of concrete foundations and footings. ACI 318-99 is referenced for the strength design of commercial grade structures and ACI 349-01 is referenced for "safety" grade structures.

24590-CM-HC4-HXYG-00138-01-0004

	Information Assessed	Y/N	Source of Information	Assessment
	Foundation material is compatible with the soil	Y	24590-WTP-DC-ST-01-001, Rev. 0, Structural Design Criteria; 24590-WTP-DB-ENG-01-001, Rev. 0, Basis of Design; 24590-WTP-3PS-DB01-T0001, Rev. 1, Engineering Specification for Furnishing and Delivering Ready Mix Concrete; 24590-BOF-3PS-C000-T0001, Rev. 1, Material Testing Services; 24590-WTP-3PS-D000-T0001, Rev. 0, Engineering Specification for Concrete Work.	ICD28 in the Basis of Design indicates that aggregate for the foundation concrete will be taken from Pit 30 as described in the ICD. The specification for Furnishing and Delivering Ready-Mix Concrete provides adequate current requirements for the selection of coarse and fine aggregates and the procurement of cementitious materials. Adequate test procedures are provided in the Material Testing Services specification for testing candidate aggregates. Instructions for mixing and delivering Ready-Mix Concrete are adequate and current. The specification for Concrete Work provides adequate requirements for forming the foundations, placing embedments for liners and reinforcing steel, and pouring the concrete. As noted in the Basis of Design document (section 4.7), the water table lies about 200 feet below the deepest foundations so there is little reason to expect compatibility problems between the concrete foundations and the site soils.
	Foundation will withstand the effects of frost heave	Y	24590-WTP-DC-ST-01-001, Rev. 0, Structural Design Criteria	The Structural Design Criteria includes adequate provisions to preclude frost heave in the section addressing Lateral Earth Pressure loads. All foundations are required to extend into the soil more than 30 inches below finish grade. The frost line is 30 inches below finished grade.
	Seismic considerations are adequate	Y	24590-WTP-DC-ST-01-001, Rev. 0, Structural Design Criteria; RPT-W375-RU00002, Issue 2, TWRS-P Facility Design Basis Earthquake - Peak Ground Acceleration, Seismic Response Spectra, and Seismic Design Approach; RPT-W375-RU00005, Rev B, Seismic Analysis and Design Approach; 24590-WTP-DB-ENG-01-001, Rev. 0, Basis of Design.	The Structural Design Criteria provides current adequate codes and standards for the design of the secondary containment structures and their liners. Lateral force design requirements for safety grade structures are consistent with guidance in RPT-W375-RU00005 and RPT-W375-RU00002. Lateral force requirements for commercial grade structures are taken from the Uniform Building Code (1997) which is appropriate. Design codes for safety grade structures are ACI 349-01 and AISC N690-1994 for concrete and steel structures respectively. Design codes for commercial grade structures are ACI-318 for concrete and Allowable Stress Design Method utilizing the Manual of Steel Construction for steel.

24590-CM-HC4-HXYG-00138-01-00A

	Information Assessed	Y/N	Source of Information	Assessment
	COMPATIBILITY & STRENGTH			
Secondary Containment	The stored waste is compatible with its Secondary Containment and leak detection hardware based on a detailed chemical and physical analysis of the wastes used and other information sources	Y	24590-WTP-PER-M-02-001, Material Selections for Building Secondary Containment/Leak Detection, Rev. 2.; Drawing No. 24590-LAW-P1-P01T-00001, Rev.0, LAW Vitrification Building General Arrangement Plan at El. (-)21'-0"; Drawing No. 24590-LAW-P1-P01T-00010, Rev 0, LAW Vitrification Building General Arrangement Section K-K and L-L	The Basis of Design states that cells and sumps are appropriately lined and any spills are removed and flushed within 24-hr or as timely as possible. The RLD-VSL-0004 tank is the C3/C5 Drains/Sump Collection Vessel. The expected waste streams are identified on the process flow diagrams. Cell L-B001B is not easily accessible and therefore the secondary containment (SC) for cell L-B001B is a stainless steel liner. The Material Selections Report for secondary containments identifies stainless steel as an appropriate liner material for the expected wastes and limited maintenance access.
			Drawing No. 24590-LAW-M6-RLD-P0002, Rev 0, P&ID-LAW Radioactive Liquid Waste Disposal System C3/C5 Drains/Sump Collection; 24590-LAW-M5K-V17T-00001, Rev A, Drawing, RPP-WTP LAW Vitrification Simplified Process Flow Diagram; 24590-LAW-M5-V17T-00014, Rev 1, Drawing, Process Flow Diagram LAW Liquid Effluent (System RLD & NLD)	The Material Selection report also identifies appropriate materials for leak detection equipment that are compatible with the expected stored waste.
	The design indicates that the Secondary Containment has sufficient strength and thickness to prevent failure owing to pressure gradients, static head during a release, physical contact with the waste, climatic conditions, and the stress of daily operations (e.g. vehicular traffic).	Y	24590-WTP-DB-ENG-01-001, Rev. 0, Basis of Design; 24590-WTP-PER-CSA-02-001, Rev. 0, Secondary Containment Design	These general requirements are stated as design goals in the Basis of Design document. The explicit design codes and standards, loads and load combinations to be used are stated in the Secondary Containment Design document. These requirements and codes and standards are adequate for the secondary containment design. Since the secondary containment is located in a cell in the Low Activity Waste building rather than directly buried, pressure gradients and vehicular traffic are not applicable load cases.
	The Secondary Containment system has sufficient strength in the presence of operational stresses from site-specific conditions (i.e. traffic, heavy equipment, precipitation, frost).	Y	24590-WTP-DB-ENG-01-001, Rev. 0, Basis of Design; 24590-WTP-PER-CSA-02-001, Rev. 0, Secondary Containment Design; 24590-WTP-3PI-NLLR-00002, Rev. 0, Engineering Specification for Furnishing, Detailing, Fabrication, Delivery and Installation of Stainless Steel Liner Plates	Because the secondary containment is installed inside the Low Activity Waste building, precipitation and frost are not applicable load cases. Secondary Containment Design identifies the applicable load cases (operational stresses) from site specific conditions that must be considered in the design. The procurement subcontract specification for furnishing the liner plates includes specific provisions for protection of completed liners during the construction process. Similar specifications for protection of coatings will be developed during the coating selection process.

24590-CM-HC4-HXYG-00137-01-00A

LAW BELOW GRADE SECONDARY CONTAINMENT

24590-CM-HC4-HXYG-00138-01-06A

	Information Assessed	Y/N	Source of Information	Assessment
	FOUNDATION INTEGRITY			
	The Secondary Containment is properly supported by a foundation or base in order to prevent failure from settlement, compression, or uplift, including the residual effects of installation	Y	24590-WTP-DB-ENG-01-001, Rev. 0, Basis of Design; 24590-WTP-PER-CSA-02-001, Rev. 0, Secondary Containment Design; 24590-WTP-DC-ST-01-001, Rev. 0, Structural Design Criteria.	These conditions are fully addressed in the reference design criteria documents. The design requirements and codes and standards specified are adequate to satisfy these requirements.
	The placement, structural support, and type of material used for backfill around and below the Secondary Containment are appropriate.	Y	24590-BOF-3PS-CE01-T0001, Rev. 2, Engineering Specification for Excavation and Backfill; 24590-BOF-3PS-C000-T0001, Rev. 1, Technical Specification for Material Testing Services.	The Excavation and Backfill and Material Testing specifications contain current adequate industry standards for selecting and testing fill materials, placing and compacting backfills, and testing not less than once each lift to assure adequate compaction. Requirements for testing and record keeping are current and adequate for both safety grade fills and commercial grade fills.
	LINER SYSTEM			
Secondary Containment	Designed to contain 100% of the capacity of the largest tank within its boundary.	Y	24590-WTP-DB-ENG-01-001, Rev. 0 Basis of Design. WTP Draft Dangerous Waste Permit # WA 7890008967.	This requirement is specified the Environmental section of the Basis of Design document. Reference materials furnished for the review are general design requirements, design and contract specifications and preliminary drawings that reflect the design intent. The draft WTP Dangerous Waste permit indicates the design will meet this requirement.
	The design or operation (e.g. diking & curbing) prevents run-on or infiltration of precipitation into the Secondary Containment system unless the collection system has sufficient excess capacity (25 yr rainfall) to contain the run-on or precipitation.	Y	24590-WTP-DB-ENG-01-001, Rev. 0 Basis of Design.	This requirement is specified in the Environmental section of the Basis of Design document. In addition, all secondary containment being reviewed is below grade in the Low Activity Waste Building.
	The design includes an external moisture barrier or other means to prevent moisture from entering the cell.	Y	Drawing No. 24590-LAW-P1-P01T-00001, Rev.0, LAW Vitrification Building General Arrangement Plan at El. (-)21'-0"; Drawing No. 24590-LAW-P1-P01T-00010, Rev 0, LAW Vitrification Building General Arrangement Section K-K and L-L; 24590-WTP-DB-ENG-01-001, Rev. 0, Basis of Design.	The tanks and cell shown on the general arrangement plan at elevation (-) 21'-0" lie below the Low Activity Waste Building which shield it from surface water percolation. The ground water table is located about 200 feet below the floor of the cell at elevation (-) 21'-0" as noted above.
	The containment area is free of cracks or gaps and the design discusses methods of their minimization (e.g. water stops, installation practices).	Y	24590-WTP-3PS-NLLR-T0002, Rev. 0, Engineering Specification for Furnishing, Detailing, Fabrication, Delivery and Installation of Stainless Steel Liner Plates; 24590-WTP-3PS-SS00-T0002, Rev. 1, Specification for Welding of Structural Stainless Steel and Welding of Structural Carbon Steel to Structural Stainless Steel ; 24590-WTP-PER-CSA-02-001, Rev. 0, Secondary Containment Design.	The Secondary Containment Design documentation provides current adequate requirements and codes and standards to provide leak tight stainless steel liners for secondary containment. Construction processes are adequately described and appropriate for installation of the liners. Standard details are shown in Secondary Containment Design. The Secondary Containment Design Report (CSA-02-001) on page 5 of 7 includes appropriate details for installation of protective coatings free of cracks and gaps.

	Information Assessed	Y/N	Source of Information	Assessment
	The design has considered the compatibility of the concrete liner or coatings and waste and presents information on coatings planning to be used from the manufacturer addressing compatibilities with the stored waste. The lining or coating must prevent the waste from migrating into the concrete.	Y	24590-WTP-PER-M-02-001, Rev. 2, Material Selections for Building Secondary Containment/Leak Detection; 24590-WTP-PER-CSA-02-001, Rev. 0, Secondary Containment Design. Drawing No. 24590-LAW-M6-RLD-P0002, Rev 0, P&ID-LAW Radioactive Liquid Waste Disposal System C3/C5 Drains/Sump Collection; 24590-LAW-3YD-20-00001, Rev A, Systems RLD and NLD LAW Vitrification Liquid Effluent System Description.	The Material Selection Study contains general information on the compatibility of planned stainless steel liners and protective coatings with the secondary containment concrete. The liner in the L-B001B cell is stainless steel. The sump RLD-SUMP-00028 is normally dry and is therefore constructed of 316L stainless steel.
	The seals (e.g. water stops) used in the joints are compatible with the waste.	N/A	Not Applicable	The L-B001B secondary containment is lined with stainless steel. The sump for room L-B001B (RLD-SUMP-00028) is 316L stainless steel. No water stops are shown in this design package.

24590-CM-HC4-HXYG-00038-01-06A

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RPP-WTP RECEIVED SEP 16 2002 BY PDC

T. A. O'Toole
Bechtel National, Inc. MS9-B
Waste Treatment Plant
3000 George Washington Way
Richland, Washington 99352

Dear Ms. O'Toole:

STRUCTURAL INTEGRITY ASSESSMENT OF THE LOW ACTIVITY WASTE BELOW GRADE SECONDARY CONTAINMENT DESIGN PACKAGE FOR THE WASTE TREATMENT AND IMMOBILIZATION PLANT - INTEGRITY ASSESSMENT, REVISION 1

The integrity assessment has been completed per the contract requirements and is attached for your use and comment. This assessment incorporates the comments received from Bechtel on September 11, 2002. The assessment found the design intent is sufficient to ensure the foundations and secondary containments will be adequately designed and that the foundations and secondary containments will have sufficient structural strength, compatibility with the waste(s) to be stored or treated, and corrosion protection to ensure that they will not collapse, rupture, or fail.

If you have any questions, please contact me at (509) 376-5445, or via facsimile at (509) 372-0504.

Sincerely,

for M.D. Pickett

K. V. Scott, Manager
Facilities, Structures & Components

kld

Attachment

cc: D. C. Pfluger MS4-E2 w/ attachment

24590-CM-HC4-HA46-00138-01-06A

MASTER DISTRIBUTION SCHEDULE

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Dan Pfluger	MS4-E2							LEAD REVIEWER
Brad Erlundson								Reviewer
Trisha O'Toole								Info

Insert rows as necessary ↑

DAN PFLUGER
Approver's Name (Print)

Approver's Signature

8/27/2007
Date

Bechtel Systems
&
Infrastructure, Inc.

JOB No. 24590

SUPPLIER DOCUMENT STATUS

1. ☒ WORK MAY PROCEED
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PERMISSION TO PROCEED DOES NOT CONSTITUTE ACCEPTANCE OR APPROVAL OF DESIGN DETAILS, CALCULATIONS, ANALYSES, TEST METHODS, OR MATERIALS DEVELOPED OR SELECTED BY THE SUPPLIER AND DOES NOT RELIEVE SUPPLIER FROM FULL COMPLIANCE WITH CONTRACTUAL OBLIGATIONS

	M	P	ML	H	MH	E	C&I	CS&A	PD	PT	ESH
REVIEWED											[illegible]

G-321 DOCUMENT CATEGORY N/A
[From Supplement A to G-321-E (E) or G-321-V (V), as applicable]
RESPONSIBLE ENGINEER [signature] DATE 4/4/03

24590-CM-HC4-HXYG-00138-01-09
REV. 00B

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4/7/03

R10045093

STRUCTURAL INTEGRITY ASSESSMENT OF THE LOW ACTIVITY WASTE FACILITY BELOW GRADE RADIOACTIVE LIQUID WASTE DISPOSAL SYSTEM ANCILLARY EQUIPMENT

COGEMA-IA-011
REV. 1

24590-CM-HC4-HXYG-00138-01-09 REV 00B

Low Activity Waste Facility Below Grade Radioactive Liquid Waste Disposal Ancillary Equipment			COGEMA-IA-011, Rev 1
Information assessed	Y/N	Source of Information	Assessment
			The ancillary equipment evaluated in this integrity assessment of the LAW Radioactive Liquid Disposal System is the ancillary equipment associated with tank RLD-VSL-00004 (C3/C5 Drain/Sump Collection Vessel) and Process Bulge RLD-BULGE-00001. Design standards for tank internal equipment are discussed in COGEMA IA-005, the integrity assessment for the LAW Radioactive Liquid Disposal System tanks.
Ancillary equipment design standards are appropriate and adequate for the equipment's intended use.	Y	24590-WTP-DC-PS-01-001, Rev 1, Pipe Stress Design Criteria; 24590-WTP-3PS-MX00-TP001, Rev 1, Engineering Specification for Process Bulge Design and Fabrication; 24590-LAW-MXD-RLD-00001, Rev. 1, Mechanical Systems Data Sheet: Process Bulge Plant Item No. RLD-BULGE-00001; 24590-LAW-M6-RLD-P0002, Rev 2, Drawing, P&ID-LAW Radioactive Liquid Waste Disposal System C3/C5 Drains/Sump Collection; 24590-LAW-3YD-20-00001, Rev 0, System Description for LAW Vitrification Liquid Effluent System (RLD and NLD); 24590-LAW-P1-P01T-P0001, Rev 2, Drawing, LAW Vitrification Building General Arrangement Plan at EL(-)21'-0"; 24590-LAW-P1-P01T-P0010, Rev 2, Drawing, LAW Vitrification Building General Arrangement Section K-K and L-L; 24590-WTP-DC-PS-01-002, Rev 1, Pipe Support Design Criteria;	Pipe Stress Design Criteria identifies ASME B31.3 (Process Piping) as the design code for piping systems of the WTP. Due to more stringent seismic requirements, the design criteria includes methodology provided in the ASME Section III Code to supplement the design rules of ASME B31.3 code for SC-I and SC-II piping. SC-III or SC-IV piping systems will be designed in accordance with the Uniform Building Code (UBC) requirements for seismic loads. Table 1 in Pipe Stress Design Criteria identifies categories of piping and the applicable design code and analysis methods, seismic loads and seismic analysis methods, and acceptance criteria. The codes and methods identified in Table 1 are appropriate for piping containing aqueous mixed waste over the range of conditions identified for this system. Pipe Support Design Criteria considers significant loadings identified in B31.3 and identifies ASME Section III, Div. 1 as the applicable code for SC-1 through SC-IV linear pipe supports. These are appropriate loadings and codes for linear pipe supports of an aqueous mixed waste piping system over the range of conditions identified for this system. Engineering Specification for Process Bulge Design and Fabrication includes requirements for general design, fabrication, project management, quality assurance, inspection and testing of Process Bulges for use in WTP facilities. The Mechanical Data Sheet indicates that RLD-BULGE-00001 is a commercial grade item. Piping within RLD-BULGE-00001 is to be designed in accordance with ASME B31.3 and the bulge Secondary Containment is to be designed in accordance with ASME Section VIII, Pressure Vessels, Parts 1 and 2 as applicable. These codes and standards are acceptable and adequate for the design of both the ancillary piping and the process bulge for the intended service.

Information assessed	Y/N	Source of Information	Assessment
If the ancillary equipment to be used is not built to a design standard, the design calculations demonstrate sound engineering principles of construction.	N/A	24590-WTP-DC-PS-01-001, Rev 1, Pipe Stress Design Criteria; 24590-WTP-3PS-MX00-TP001, Rev 1, Engineering Specification for Process Bulge Design and Fabrication;	The ancillary equipment is built to design standards. The WTP piping is to be designed per ASME B31.3 supplemented by ASME Section III, and the UBC as identified in Pipe Stress Design Criteria. The piping supports are designed using load ratings for Component Standard type pipe supports and are otherwise designed using allowables from ASME Section III, Div 1. Engineering Specification for Process Bulge Design and Fabrication states that work shall be done in accordance with appropriate design codes and standards for the internal piping (ASME B31.3) and for the Bulge Secondary Containment (ASME Section VIII).
Ancillary equipment has adequate strength at the end of its design life to withstand the operating pressure, operating temperature, thermal expansion or contraction, and seismic loads. Equipment is protected against physical damage and excessive stress due to settlement or vibration.	Y	24590-WTP-DC-PS-01-001, Rev 1, Pipe Stress Design Criteria; 24590-WTP-3PS-MX00-TP001, Rev 1, Engineering Specification for Process Bulge Design and Fabrication; 24590-WTP-PER-M-02-002, Rev 0, Materials for Ancillary Equipment; 24590-WTP-DC-PS-01-002, Rev 1, Pipe Support Design Criteria; 24590-WTP-DB-ENG-01-001, Rev. 0, Basis of Design	For piping design, rules for consideration of operating pressure, operating temperature, thermal expansion, and seismic loads are provided by ASME B31.3 (ASME B31.3 is identified as the design code for WTP piping in Pipe Stress Design Criteria). ASME B31.3 includes vibration, settlement and corrosion allowance as design considerations. The ASME section III Code is used to supplement the design rules of the ASME B31.3 Code to provide appropriate seismic design requirements. Pipe Support Design Criteria considers all significant loadings identified in ASME B31.3. The required design life of 40 years for ancillary equipment is identified in the Basis of Design. Components in non-maintainable areas are to be designed to last the entire design life of the plant. Vessel/Tank Material Selection Data Sheets for the vessel, and vessel internal equipment, identify corrosion allowances for a 40 year life. Materials for Ancillary Equipment identifies a conservative approach such that ancillary equipment downstream of a source vessel is constructed of the same or better material and with the same corrosion allowance as the source vessel itself. Since the vessels all have detailed corrosion analyses (within the Vessel/Tank Material Selection Data Sheets), using the same or better materials ensures that the material will be appropriate for the wastes for the entire design life. If the material for the ancillary equipment is to be different from the source vessel, and analysis by the materials group is required (Materials for Ancillary Equipment).

Information assessed	Y/N	Source of Information	Assessment
Ancillary equipment supports are adequately designed.	Y	24590-WTP-DC-PS-01-002, Rev 1, Pipe Support Design Criteria; 24590-WTP-PL-PS-01-001, Rev 1, Verification and Validation Plan for Bechtel's ME150 Pipe Support Family of Programs (PCFAPPS); 24590-WTP-VV-PS-01-001, Rev 1, Verification and Validation Report for ME101, Linear Elastic Analysis of Piping Version N6; 24590-WTP-3PS-MX00-TP001, Rev 1, Engineering Specification for Process Bulge Design and Fabrication	The Pipe Support Design Criteria considers the significant loadings (operating pressure, operating temperature, thermal expansion, vibration, settlement and seismic loads). Supporting components are to be designed to allow a minimum of heat to be transferred to the building structures (building structures not to exceed 150 deg F for concrete and 200 deg F for steel, Pipe Support Design Criteria). Pipe Support Design Criteria specifically addresses component standard type pipe supports, linear type pipe supports, design of welds, attachments to building structures, requirements for bolted joints, loads, load conditions, allowable stresses, clearances, multiple pipe frame supports, and clamps and attachments to pipe. Loads are evaluated against the design criteria provided in ASME Section III, Div 1 (using allowable limits for normal load conditions for SC-I/SC-II supports and allowable limits for faulted load conditions for SC-III/SC-IV supports). Analysis is by manual calculation or approved computer programs. The subjects covered in Pipe Support Design Criteria and the use of ASME Section III, Div 1 design criteria are appropriate and adequate for an aqueous mixed waste piping system over the range of conditions identified for this system. Use of approved and validated computer programs to analyze piping designs is appropriate. Design standards for vessel internal equipment supports are discussed in COGEMA IA-005, the integrity assessment for the LAW Radioactive Liquid Disposal System tanks. Engineering Specification for Process Bulge Design and Fabrication includes appropriate standards for the design of supports. The specification also includes appropriate information on seismic loading and environmental conditions. The specification requires the seller to carry out dynamic seismic analysis for supports and specifies that pumps, pipework, valves and fittings are to be supported to minimize vibration, deflection, and nozzle loading. Since RLD-BULGE-00001 is commercial grade, the seismic design and analysis rules are those of the Uniform Building Code (UBC).

Low Activity Waste Facility Below Grade Radioactive Liquid Waste Disposal Ancillary Equipment			COGEMA-IA-011, Rev 1
Information assessed	Y/N	Source of Information	Assessment
Seams and connections are adequately designed.	Y	24590-WTP-DB-ENG-01-001, Rev 0, Basis of Design; 24590-WTP-DC-PS-01-001, Rev. 1, Pipe Stress Design Criteria; 24590-WTP-3PS-MX00-TP001, Rev 1, Engineering Specification for Process Bulge Design and Fabrication; 24590-WTP-3PS-PS02-T0001, Rev 1, Engineering Specification for Shop Fabrication of Piping	The Basis of Design states that in-cell and in-cave process and service piping connections will be designed to minimize the potential for liquid waste leakage or seepage when disconnected. Basis of Design also states that in-cell pipework that is non-maintainable will be fully welded. Pipe Stress Design Criteria specifies ASME B31.3 design code for the piping systems supplemented by ASME Section III, Div. 1 for seismic design. ANSI B16.5 is applied for flange designs. Welding is per ASME B31.3 and ASME Section IX. These are appropriate basis of design and design codes for the aqueous mixed waste solutions system being evaluated. The engineering specification for Process Bulges states that primary confinement pipework shall be fabricated using 100% butt-welded construction with 100% radiography for Quality Level 1 (QL-1) components and 20% radiography for other quality levels. These are appropriate fabrication and Non Destructive Testing (NDT) requirements for the aqueous mixed waste solutions system being evaluated.
The system will withstand the effects of frost heave.	N/A	24590-WTP-DC-ST-01-001, Rev. 0, Structural Design Criteria; 24590-LAW-P1-P01T-P0001, Rev 2, Drawing, LAW Vitrification Building General Arrangement Plan at EL.(-)21'-0"	The evaluated ancillary equipment is located below grade at the -21 foot elevation level of the Low Activity Waste facility in an enclosed C3/C5 cell. The Structural Design Criteria identifies the frost line as 30 inches below grade. The ancillary equipment considered in this assessment is located below the frost line.
Characteristics of the waste to be stored or treated have been identified (ignitable, reactive, toxic, specific gravity, vapor pressure, flash point, temperature)	Y	24590-WTP-PER-M-02-002, Rev. 0, Materials for Ancillary Equipment; 24590-WTP-DB-ENG-01-001, Rev. 0, Basis of Design; 24590-LAW-3YD-20-00001, Rev 0, System Description for LAW Vitrification Liquid Effluent System (RLD and NLD); 24590-WTP-PSAR-ESH-01-002-03, Rev 0, Preliminary Safety Analysis Report to Support Construction Authorization; LAW Facility Specific Information	The ancillary equipment considered in this assessment will handle wastes with the same characteristics as do the source vessels. Operating pressures for ancillary equipment may be different than those of the vessels, enveloping pressures and temperatures are reflected in the pipe class assigned to each pipe run. Vessel/Tank Material Selection Data Sheets for the source vessels contain information on the characteristics of the waste carried by the downstream ancillary equipment (refer to the integrity assessment of the source vessel for waste characteristics for each pipe run). The Preliminary Safety Analysis Report (PSAR) provides a summary of potential hazardous conditions associated with each LAW Facility vessel and the design provisions that are to be used to provide adequate control of each hazard. These hazards range from radioactive liquid spills to criticality. Design provisions for control of the hazards are listed in the PSAR.

Information assessed	Y/N	Source of Information	Assessment
Ancillary equipment is designed to handle the wastes with the characteristics defined above and any treatment reagents.	Y	24590-WTP-PER-M-02-002, Rev 0, Materials for Ancillary Equipment; 24590-LAW-3YD-20-00001, Rev 0, System Description for LAW Vitrification Liquid Effluent System (RLD and NLD); 24590-WTP-PSAR-ESH-01-002-03, Rev 0, Preliminary Safety Analysis Report to Support Construction Authorization; LAW Facility Specific Information	As noted in the adjacent entry above, the source tank is designed to store the waste and treatment reagents (if any) that it receives. The ancillary equipment materials in contact with the waste are to be equal to or better than the upstream vessel. Also as noted above, the Preliminary Safety Analysis (PSAR) identifies the potential hazards associated with the Liquid Effluent System. The PSAR also identifies design provisions for control of the identified credible hazards.
The pH range of the waste, waste temperature, and the corrosion behavior of the structural materials are adequately addressed. Ancillary equipment material and protective coatings ensure the ancillary equipment structure is adequately protected from the corrosive effects of the waste stream and external environments. The protection is sufficient to ensure the equipment will not leak or fail for the design life of the system.	Y	24590-WTP-PER-M-02-002, Rev 0, Materials for Ancillary Equipment; 24590-WTP-3PS-MX00-TP001, Rev 1, Engineering Specification for Process Bulge Design and Fabrication; 24590-LAW-3YD-20-00001, Rev 0, System Description for LAW Vitrification Liquid Effluent System (RLD and NLD); 24590-WTP-3PS-NN00-T0001, Rev. 0, Engineering Specification for Hot and Anti-Sweat Thermal Insulation; 24590-WTP-DB-ENG-01-001, Rev. 0, Basis of Design	The Basis of Design identifies a service design life of 40 years for the ancillary equipment. All non-maintainable items will be designed to last the life of the facility. Materials for Ancillary Equipment requires that the material selection and corrosion/erosion allowances for ancillary equipment in contact with the waste will be equal to or better than the material and corrosion allowance of the waste source vessel. The pH range and temperature of the waste are identified on the Vessel/Tank Material Selection Data Sheets for the source vessels. Corrosion interactions with the materials are addressed by the Vessel/Tank Material Selection Data Sheets for the upstream vessels (refer to the integrity assessments for the source vessels). The Specification for Process Bulge Design and Fabrication requires that the bulges be designed for a 40 year service life. For Bulge components that cannot meet this requirement, the design is required to provide a mechanism for replacement and/or maintenance. The materials selection process for the ancillary equipment and the process bulge has considered the expected ranges in waste composition, operating temperatures and pH to select materials with sufficient corrosion resistance to assure the requisite 40 year service life for these components. The Thermal Insulation specification requires that all insulating materials used in the building be pre-approved for use on austenitic stainless steel in accordance with applicable ASTM procedures and tests. Therefore, insulation installed on ancillary equipment piping and components has been selected to prevent external corrosion and maintain the design service life.

Information assessed	Y/N	Source of Information	Assessment
Corrosion allowance is adequate for the intended service life of the ancillary equipment.	Y	24590-WTP-PER-M-02-002, Rev 0, Materials for Ancillary Equipment; 24590-WTP-DC-PS-01-001, Rev 1, Pipe Stress Design Criteria; 24590-LAW-3YD-20-00001, Rev 0, System Description for LAW Vitrification Liquid Effluent System (RLD and NLD); 24590-WTP-DB-ENG-01-001, Rev. 0, Basis of Design	ASME B31.3 is the code for the WTP piping, ASME Section VIII is the code for the bulge containment. Consideration of corrosion, including corrosion allowance, is a requirement of both ASME B31.3 and ASME Section VIII. As noted above, the required service life of 40 years is identified in the Basis of Design and System Description. An appropriate corrosion allowance for a 40 year service life is identified on the Vessel/Tank Material Selection Data Sheet for the upstream vessels. Materials for Ancillary Equipment requires that downstream ancillary equipment is to be constructed of equal or better materials and use the same corrosion allowance as the source vessel.
Pressure controls (vents and relief valves) are adequately designed to ensure pressure relief if normal operating pressures in the tank are exceeded.	Y	24590-WTP-DC-PS-01-001, Rev 1, Pipe Stress Design Criteria.	Pressure controls related to the RLD-VSL-00004 vessel itself are discussed in the vessel structural integrity assessment. ASME B31.3 is the design code for the WTP piping. ASME B31.3 requires provision be made to safely contain or relieve any pressure to which the piping may be subjected. ASME B31.3 piping not protected by a pressure relieving device, or that can be isolated from a pressure reliving device, must be designed for at least the highest pressure that can be developed. This requirement applies to ancillary equipment piping and said piping when it penetrates a Bulge.
Maximum flows and any unusual operating stresses are identified	Y	24590-LAW-M5K-V17T-00001, Rev A, Drawing, RPP-WTP LAW Vitrification Simplified Process Flow Diagram; 24590-LAW-M5-V17T-P0014, Rev 1, Drawing, Process Flow Diagram LAW Liquid Effluent (System RLD & NLD); 24590-LAW-M6-RLD-P0002, Rev 2, Drawing, P&ID-LAW Radioactive Liquid Waste Disposal System C3/C5 Drains/Sump Collection	The expected flow paths for the ancillary equipment are identified on the Process Flow Diagrams. The maximum flows will be determined later in detail design; however, ASME B31.3 requires piping to be designed to the highest pressure that can be developed assuring that the maximum operating stresses remain within code allowables.

Information assessed	Y/N	Source of Information	Assessment
Ancillary equipment is designed with secondary containment that is constructed of materials compatible with the waste and of sufficient strength to prevent failure (pressure gradients, waste, climatic conditions, daily operations), provided with a leak-detection system, and designed to drain and remove liquids.	Y	24590-WTP-PER-M-02-001, Rev. 2, Material Selections for Building Secondary Containment/Leak Detection; 24590-LAW-M6-RLD-P0002, Rev 2, Drawing, P&ID-LAW Radioactive Liquid Waste Disposal System C3/C5 Drains/Sump Collection; 24590-LAW-P1-P01T-P0001, Rev 2, Drawing, LAW Vitrification Building General Arrangement Plan at EL. (-)21'-0"; 24590-WTP-3PS-MX00-TP001, Rev 1, Engineering Specification for Process Bulge Design and Fabrication; 24590-LAW-MXD-RLD-00001, Rev 1, Mechanical Data Sheet: Process Bulge; 24590-WPT-PER-J-02-001, Rev 2, Leak Detection - Sump Level Measurement in Secondary Containment	The ancillary equipment is located below grade (-21 foot elevation) within the Low Activity Waste facility. The tank is enclosed within a R3/C5 cell. This cell contains a liner and sump to provide secondary containment for ancillary equipment within the cell. The liners and sumps are discussed separately in the LAW Below Grade Secondary Containment integrity assessment. Note 19 of the P&ID drawing (RLD-P0002, Rev. 2) specifies double walled piping for C1/C2 areas to provide containment. The double wall piping terminates in the C5 room (L-B001B) where containment is provided by the liner. The double wall piping shown on the P&ID drains to sump RLD-SUMP-00028. The engineering specification for process bulges includes requirements for confinement (containment) and the P&ID shows the containment for Process Bulge RLD-BULGE-00001 drains to RLD-SUMP-00028. The process bulges are designed to provide secondary containment for all the equipment contained within the boundaries of the bulge. The bulge is equipped with a low point sump with a strainer in line with the bulge drain line which is routed to sump RLD-SUMP-00028. The drain line is free draining and terminates immediately above the sump. There is no leak detection in the bulge; however, there is leak detection in the sump located in cell L-B001B as shown on the P&ID drawing. The Mechanical Data Sheet for the bulge identifies 316L stainless steel as the material for the confinement and support structure. This is consistent with the Materials Selections for Building Secondary Containment report. This report identifies 316L stainless steel as appropriate for Secondary Containment sumps that operate dry with occasional process waste spills. The process bulge will be constructed with materials appropriate for its function to provide Secondary Containment for the ancillary equipment. The process cell liners provide Secondary Containment for ancillary equipment located within the cell boundaries; however, these secondary containments are addressed in separate Integrity Assessments.

IQRPE REVIEW – LOW ACTIVITY WASTE FACILITY BELOW GRADE RADIOACTIVE LIQUID WASTE DISPOSAL SYSTEM ANCILLARY EQUIPMENT

"I, Michael L. Vosk, have reviewed, and certified a portion of the design of a new tank system or component located at the Hanford Waste Treatment Plant, owned/operated by Department of Energy, Office of River Protection, Richland, Washington. My duties were independent review of the current design for the Low Activity Waste Facility Below Grade Radioactive Liquid Waste Disposal System Ancillary Equipment as required by the Dangerous Waste Regulations, namely, WAC 173-303-640(3) (applicable paragraphs (i.e., (a) through (g))."

"I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment."

The documentation reviewed indicates that the design intent fully satisfies the requirements of the WAC.

The attached review is 7 sheets numbered 1 through 7.

MICHAEL L. VOSK
STATE OF WASHINGTON
38908
REGISTERED
PROFESSIONAL ENGINEER
4-4-03
EXPIRES: 9-11-03

Signature 4-4-03
Date

1073
8
4/4/03

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April 4, 2003

COGEMA-03-0117

T. A. O'Toole
Bechtel National, Inc.
Waste Treatment Plant
2435 Stevens Center
Richland, Washington 99352

Dear Ms. O'Toole:

STRUCTURAL INTEGRITY ASSESSMENT OF THE LOW ACTIVITY WASTE FACILITY BELOW GRADE RADIOACTIVE LIQUID WASTE DISPOSAL SYSTEM ANCILLARY EQUIPMENT, REVISION 1

The integrity assessment has been completed per the contract requirements and is attached for your use. The assessment found the design intent is sufficient to ensure the ancillary equipment will be adequately designed and that the ancillary equipment will have sufficient structural strength, compatibility with the waste(s) to be stored or treated, and corrosion protection to ensure that they will not collapse, rupture, or fail.

If you have any questions, please contact me at (509) 376-5445, or via facsimile at (509) 372-0504.

Sincerely,

K V Scott

K. V. Scott, Manager
Facilities, Structures & Components

kld

Attachment

cc: D. C. Pfluger w/ attachment

283
To
4/4/03

MASTER DISTRIBUTION SCHEDULE

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Dan Pfluger	MS4-E2							LEAD REVIEWER
Brad Erlundson								Reviewer
Trisha O'Toole								Info

Insert rows as necessary ↑

DAN PFLUGER

Approver's Name (Print)

Approver's Signature

8/27/2002

Date

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Bechtel Systems & Infrastructure, Inc.

JOB No. 24590

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3. ☐ REVISE AND RESUBMIT. WORK MAY NOT PROCEED
4. ☐ REVIEW NOT REQUIRED. WORK MAY PROCEED.

PERMISSION TO PROCEED DOES NOT CONSTITUTE ACCEPTANCE OR APPROVAL OF DESIGN DETAILS, CALCULATIONS, ANALYSES, TEST METHODS, OR MATERIALS DEVELOPED OR SELECTED BY THE SUPPLIER AND DOES NOT RELIEVE SUPPLIER FROM FULL COMPLIANCE WITH CONTRACTUAL OBLIGATIONS.

	M	P	ML	H	MH	E	C&I	CS&A	PD	PT	ESH
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G-321 DOCUMENT CATEGORY N/A
[From Supplement A to G-321-E (E) or G-321-V (V), as applicable]
RESPONSIBLE ENGINEER [signature] DATE 5/12/03

24590-CM-HC4-HXYG-00138-01-10
REV. 00B

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IQRPE REVIEW – LOW ACTIVITY WASTE FACILITY 3' –0" ELEVATION SECONDARY CONTAINMENT

"I, John T. Baxter, have reviewed, and certified a portion of the design of a new tank system or component located at the Hanford Waste Treatment Plant, owned/operated by Department of Energy, Office of River Protection, Richland, Washington. My duties were independent review of the current design for the Low Activity Waste Facility 3' –0" Elevation Secondary Containment as required by the Dangerous Waste Regulations, namely, WAC 173-303-640(3) (applicable paragraphs (i.e., (a) through (g)."

"I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment."

The documentation reviewed indicates that the design intent fully satisfies the requirements of the WAC.

The attached review is 6 sheets numbered 1 through 6.

JOHN T. BAXTER
STATE OF WASHINGTON
18978
REGISTERED PROFESSIONAL ENGINEER
EXPIRES: 10/28/04

John T. Baxter 05/07/03

Signature Date

5/12/03

Processed/ Data Entry | Copied/ QA | Scanned | Filed

sg 5/12/03

5/12/03

24590-CM-HC4-HXYG-00138-01-10, REV. 00B

STRUCTURAL INTEGRITY ASSESSMENT OF LOW ACTIVITY WASTE FACILITY 3' –0" ELEVATION SECONDARY CONTAINMENT

COGEMA-IA-012
REV. 1

	Information Assessed	Y/N	Source of Information	Assessment
Scope	Scope of this Integrity Assessment	This integrity assessment addresses Low Activity Waste Facility Elevation 3'-0" Secondary Containment. All cells are located at the nominal elevation of 3'-0". The specific cells considered in this assessment are: L-0112, L-0123, L-0124, L-0125 and L-0126. Cell L-0112 is evaluated only for foundation structural support adequacy without consideration of the secondary containment function.		
Scope	Drawings	The drawings are the general arrangement plan at elevation 3'-0" and associated sections. 24590-LAW-P1-P01T-P0002, Rev. 2, LAW VITRIFICATION BUILDING GENERAL ARRANGEMENT PLAN AT EL. 3'-0"; 24590-LAW-P1-P01T-P0007, Rev. 2, LAW VITRIFICATION BUILDING GENERAL ARRANGEMENT SECTION A-A, B-B AND C-C; 24590-LAW-P1-P01T-P0008, Rev. 2, LAW VITRIFICATION BUILDING GENERAL ARRANGEMENT SECTION D-D, E-E AND F-F; 24590-LAW-P1-P01T-P0009, Rev. 2, LAW VITRIFICATION BUILDING GENERAL ARRANGEMENT SECTION G-G, H-H AND J-J; 24590 LAW P1 P01T P0010, Rev. 3, LAW VITRIFICATION BUILDING GENERAL ARRANGEMENT SECTION K-K AND L-L 24590 LAW P1 P01T P0001, Rev. 2, LAW VITRIFICATION BUILDING GENERAL ARRANGEMENT PLAN AT EL. (-) 21'-0"		
Foundation Design	Description of subsurface conditions and soil bearing capacity are adequate.	Y	WTSC99-1036-42-17, RPP-WTP Geotechnical Investigation Report by Shannon & Wilson, Inc., May 2000; 24590-WTP-DC-ST-01-001, Rev. 0, Structural Design Criteria; 24590-BOF-3PS-CE01-T0001, Rev. 4, Engineering Specification for Excavation and Backfill; 24590-BOF-3PS-C000-T0001, Rev. 2, Technical Specification for Material Testing Services	The Structural Design Criteria adequately presents design guidance for both mat and spread footings based on the geotechnical site investigation for the facility (WTSC99-1036-42-17, Shannon & Wilson, Inc., 2000). Bearing capacity and settlement design parameters are furnished for the dense Hanford Upper and Lower Sand Units and Structural Fill. Use of the loose wind blown (dune) sands for foundations is precluded. The Excavation and Backfill specification provides structural backfill requirements based on the geotechnical report and adequate current codes and standards for selection, placing, and compacting structural backfill including testing of candidate fill materials and completed backfills. The Specification for Material Testing Services provides current adequate codes and standards for testing of candidate structural fill materials and in-situ testing of structural fills as they are constructed. The codes and standards are consistent with those called out in the Excavation and Backfill specification.

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3

	Information Assessed	Y/N	Source of Information	Assessment
Foundation Design	Foundation design loads (including full tanks) and estimated settlement are adequately considered.	Y	24590-WTP-DC-ST-01-001, Rev. 0, Structural Design Criteria; WTSC99-1036-42-17, RPP-WTP Geotechnical Investigation Report by Shannon & Wilson, Inc., May 2000	The Structural Design Criteria uses current adequate standards to define design loads and load combinations (ASCE 7-98, ACI 318-99, ACI 318R-99). Dead and Fluid loads are included in these loads and load combinations. Settlement design parameters are included in the Structural Design Criteria subsection on geotechnical design parameters and foundation design. These design parameters are taken from the geotechnical site investigation report by Shannon & Wilson, Inc. (WTSC99-1036-42-17).
	Design calculation approach and design basis of footings with design standard references (e.g., ACI) are adequate.	Y	24590-WTP-DC-ST-01-001, Rev. 0, Structural Design Criteria	The Structural Design Criteria references current adequate design criteria for the design of concrete foundations and footings. ACI 318-99 is referenced for the strength design of commercial grade structures.
	Foundation material is compatible with the soil.	Y	24590-WTP-DB-ENG-01-001, Rev. 0, Basis of Design; 24590-WTP-3PS-DB01-T0001, Rev. 5, Engineering Specification for Furnishing and Delivering Ready-Mix Concrete; 24590-BOF-3PS-C000-T0001, Rev. 2, Technical Specification for Material Testing Services	The specification for Furnishing and Delivering Ready-Mix Concrete provides adequate current testing requirements for the selection of coarse and fine aggregates and the procurement of cementitious materials. Adequate test procedures are provided in the Material Testing Services specification for testing candidate aggregates for chemical reactivity. Instructions for mixing and delivering Ready-Mix Concrete are adequate and current. As noted in the Basis of Design document (section 4.7), the water table lies about 200 feet below the deepest foundations so there is little reason to expect compatibility problems between the concrete foundations and the site soils.
	Foundation will withstand the effects of frost heave.	Y	24590-WTP-DC-ST-01-001, Rev. 0, Structural Design Criteria	The Structural Design Criteria includes adequate provisions to preclude frost heave in the section addressing lateral earth pressure loads. All foundations are required to extend into the soil more than 30 inches below finish grade. The frost line is 30 inches below finished grade.

4

	Information Assessed	Y/N	Source of Information	Assessment
Foundation Design	Seismic considerations have been adequately addressed.	Y	24590-WTP-PER-CSA-02-001, Rev. 3, Secondary Containment Design; 24590-WTP-DC-ST-01-001, Rev. 0, Structural Design Criteria; ACI 318-99, Building Code Requirements for Structural Concrete and Commentary; AISC MO16-89, Manual of Steel Construction - Allowable Stress Design, Ninth Edition 1997 UBC, Uniform Building Code	The Secondary Containment Design document provides a summary description of the Design Methodologies, Materials, Loads, and Load Combinations for seismic design of the LAW secondary containment. The Structural Design Criteria provides requirements, codes and standards for the design of Seismic Category III (SC-III) LAW secondary containment foundations, structures, and liners by the design engineers. ACI-318-99 and ACI 318R-99 are the design codes for design of the secondary containment reinforced concrete foundations and structures. Stainless steel liners for SC-III secondary containments are to be designed using AISC MO16 (Allowable Stress Design). Seismic lateral load and design detailing requirements for the LAW secondary containments and liners are taken from the Uniform Building Code (1997 UBC). The seismic design codes and standards and lateral force requirements have been adequately addressed.
Compatibility & Strength	The stored waste is compatible with its Secondary Containment and leak detection hardware based on a detailed chemical and physical analysis of the wastes used and other information sources.	Y	24590-WTP-DB-ENG-01-001, Rev. 0, Basis of Design; 24590-WTP-PER-M-02-001, Rev. 2, Material Selections for Building Secondary Containment/Leak Detection; 24590-WTP-PER-CSA-02-001, Rev. 3, Secondary Containment Design; 24590-WTP-PER-J-02-001, Rev. 3, Leak Detection - Sump Level Measurement in Secondary Containment Systems; 24590-LAW-P1-P01T-P0002, Rev. 2, LAW VITRIFICATION BUILDING GENERAL ARRANGEMENT PLAN AT EL. 3'-0"	The Basis of Design states that cells and sumps are appropriately lined and any spills are removed and flushed within 24-hr or as timely as possible. Based on detailed analysis of the corrosive properties of expected waste process operations and evaluation of potential leak scenarios, the Material Selection report identifies appropriate corrosion resistant materials for Secondary Containment liners and coatings . The Secondary Containment Design report provides adequate typical construction details for liners including tank anchorage details, stainless steel liner details, special protective coatings, sumps, and leak detection equipment to be used for Secondary Containment. Typical details are furnished for leak detection and sump level measurement systems equipment both in cell, and out of cell in the Leak Detection - Sump Level Measurement specification. The rooms with Secondary Containments and the associated sumps are shown on the General Arrangement Plan.

5

	Information Assessed	Y/N	Source of Information	Assessment
Compatibility & Strength	The design shows that the Secondary Containment has sufficient strength and thickness to prevent failure owing to pressure gradients, static head during a release, physical contact with the waste, climatic conditions, and the stress of daily operations (e.g., vehicular traffic).	Y	24590-WTP-DB-ENG-01-001, Rev. 0, Basis of Design; 24590-WTP-PER-CSA-02-001, Rev. 3, Secondary Containment Design; 24590-LAW-P1-P01T-P0002, Rev. 2, LAW VITRIFICATION BUILDING GENERAL ARRANGEMENT PLAN AT EL. 3'-0" and the associated Cross-Section drawings; 24590-LAW-P1-P01T-P0001, Rev. 2, LAW VITRIFICATION BUILDING GENERAL ARRANGEMENT PLAN AT EL. (-) 21'-0"	These general requirements are stated as design goals in the Basis of Design document. The explicit design codes and standards, loads and load combinations to be used are stated in the Secondary Containment Design requirements document. These requirements and codes and standards are adequate for the secondary containment design. Since the secondary containments being considered are located in cells inside the Low Activity Waste Vitrification Building rather than directly buried as shown in the plan and cross-sections, pressure gradients and vehicular traffic are not applicable load cases. The floors in room L-0112 are structurally adequate to support the melters. Examination of the general arrangement plan for elevation (-) 21'-0" shows that cells LB-021, LB-024 and LB-026 are located directly below the melters. Therefore, the floors supporting the melters have heavy concrete bearing walls underneath all four sides of the floor slabs to carry loads down to the foundation mat.
	The Secondary Containment system has sufficient strength in the presence of operational stresses from site-specific conditions (i.e., traffic, heavy equipment, precipitation, frost).	Y	24590-WTP-DB-ENG-01-001, Rev. 0, Basis of Design; 24590-WTP-PER-CSA-02-001, Rev. 3, Secondary Containment Design; 24590-WTP-3PS-NLLR-T0002, Rev. 0, Engineering Specification for Furnishing, Detailing, Fabrication, Delivery and Installation of Stainless Steel Liner Plates; 24590-WTP-PER-M-02-001, Rev. 2, Material Selections for Building Secondary Containment/Leak Detection	Because the Secondary Containment being considered is installed inside the Low Activity Waste Vitrification Building, precipitation and frost are not applicable load cases. The Secondary Containment Design requirements document identifies the applicable load cases (operational stresses) from site specific conditions that must be considered in the design. The procurement subcontract specification for furnishing the stainless steel liner plates includes specific provisions for protection of completed liners during the construction process. Similar specifications for protection of coatings will be developed during the coating selection process. Factors to be considered during coating selection are discussed in the Material Selection Report for Building Secondary Containment.

	Information Assessed	Y/N	Source of Information	Assessment
Foundation Integrity	The Secondary Containment is properly supported by a foundation or base in order to prevent failure from settlement, compression, or uplift, including the residual effects of installation.	Y	24590-WTP-DC-ST-01-001, Rev. 0, Structural Design Criteria; 24590-WTP-PER-CSA-02-001, Rev. 3, Secondary Containment Design; 24590-LAW-P1-P01T-P0002, Rev. 2, LAW VITRIFICATION BUILDING GENERAL ARRANGEMENT PLAN AT EL. 3'-0" and the associated Cross-Section drawings; 24590-LAW-P1-P01T-P0001, Rev. 2, LAW VITRIFICATION BUILDING GENERAL ARRANGEMENT PLAN AT EL. (-) 21'-0"	These conditions are fully addressed in the Structural Design Criteria and the Secondary Containment Design requirements documents. The design requirements and codes and standards specified are adequate to satisfy these performance goals. The procurement and construction specifications adequately provide for proper foundation construction and installation of the Secondary Containment. The general arrangement plan drawing for elevation 3'-0" and the associated cross-sections provide an adequate description of the Secondary Containment. The floors in room L-0112 are structurally adequate to support the melters. Examination of the general arrangement plan for elevation (-) 21'-0" shows that cells LB-021, LB-024 and LB-026 are located directly below the melters. Therefore, the floors supporting the melters have heavy concrete bearing walls underneath all four sides of the floor slabs to carry loads down to the foundation mat.
	The placement, structural support, and type of material used for backfill around and below the Secondary Containment are appropriate.	Y	24590-BOF-3PS-CE01-T0001, Rev. 3, Engineering Specification for Excavation and Backfill; 24590-BOF-3PS-C000-T0001, Rev. 2, Technical Specification for Material Testing Services	The Excavation and Backfill and Material Testing specifications contain current adequate industry standards for selecting and testing fill materials, placing and compacting backfills, and testing not less than once each lift to assure adequate compaction. Requirements for testing and record keeping are current and adequate for both safety grade fills and commercial grade fills.
	The design or operation (e.g., diking & curbing) prevents run-on or infiltration of precipitation into the Secondary Containment system unless the collection system has sufficient excess capacity (25 yr rainfall) to contain the run-on precipitation.	Y	24590-WTP-DB-ENG-01-001, Rev. 0 Basis of Design; 24590-LAW-P1-P01T-P0002, Rev. 2, LAW VITRIFICATION BUILDING GENERAL ARRANGEMENT PLAN AT EL. 3'-0" and the associated Cross-Section drawings	This requirement is specified in the Environmental section of the Basis of Design document. Secondary containments being reviewed in this Integrity Assessment are all located inside the Low Activity Waste Vitrification Building where they are protected from precipitation as shown in the General Arrangement Plan and the associated Cross-Section drawings.

	Information Assessed	Y/N	Source of Information	Assessment
Liner System	The design includes an external moisture barrier or other means to prevent moisture from entering the cell.	Y	24590-WTP-DB-ENG-01-001, Rev. 0, Basis of Design; 24590-LAW-P1-P01T-P0002, Rev. 2, LAW VITRIFICATION BUILDING GENERAL ARRANGEMENT PLAN AT EL. 3'-0" and the associated Cross-Section drawings	The Secondary Containments shown in the general arrangement plan at elevation 3'-0" are inside the Low Activity Waste Vitrification Building which shields them from precipitation and surface water percolation. The ground water table is located about 200 feet below the floors of the cells at elevation 3'-0" as noted in the Basis of Design document.
	The containment area is free of cracks or gaps and the design discusses methods of their minimization.	Y	24590-WTP-PER-CSA-02-001, Rev. 3, Secondary Containment Design; 24590-WTP-3PS-NLLR-T0002, Rev. 0, Engineering Specification for Furnishing, Detailing, Fabrication, Delivery and Installation of Stainless Steel Liner Plates	The Secondary Containment Design requirements document provides current adequate design requirements and codes and standards to design leak tight stainless steel liners for Secondary Containment. This report (CSA-02-001) also includes appropriate details for installation of protective coatings free of cracks and gaps. The procurement specification for design, fabrication and installation of stainless steel liners identifies construction processes that are adequate and appropriate for installation of the liners.
	The design has considered the compatibility of the concrete liner or coatings and waste and presents information on coatings planning to be used from the manufacturer addressing compatibility with the stored waste. The lining or coating must prevent the waste from migrating into the concrete.	Y	24590-WTP-PER-M-02-001, Rev. 2, Material Selections for Building Secondary Containment/Leak Detection; 24590-WTP-PER-CSA-02-001, Rev. 3, Secondary Containment Design	The Material Selection Study contains general information on the compatibility of planned Secondary Containment stainless steel liners and protective coatings with the waste. The Secondary Containment Design report provides standard details for liners and coatings that will prevent migration of the waste into the concrete.

✓

COGEMA ENGINEERING

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BNI-Subcontracts

May 7, 2003

COGEMA-03-0153

T. A. O'Toole
Bechtel National, Inc.
Waste Treatment Plant
2435 Stevens Center
Richland, Washington 99352

Dear Ms. O'Toole:

STRUCTURAL INTEGRITY ASSESSMENT OF LOW ACTIVITY WASTE FACILITY 3' –0" ELEVATION SECONDARY CONTAINMENT, REVISION 1

The integrity assessment has been completed per the contract requirements and is attached for your use. The assessment found the design intent is sufficient to ensure the waste facility will be adequately designed and that the facility will have sufficient structural strength, compatibility with the waste(s) to be stored or treated, and corrosion protection to ensure that it will not collapse, rupture, or fail.

If you have any questions, please contact me at (509) 376-5445, or via facsimile at (509) 372-0504.

Sincerely,

KVScott

K. V. Scott, Manager
Facilities, Structures & Components

kld

Attachment

cc: D. C. Pfluger w/ attachment

9

MASTER DISTRIBUTION SCHEDULE

Project Name: RPP-WTP

Document Distribution: 24590-CM-HC4-HXYG-00138

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Brad Erlundson								Reviewer
Trisha O'Toole								Info

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DAN PFLUGER
Approver's Name (Print)

Approver's Signature

8/27/2007
Date

Bechtel National, Inc.

Job No. 24590

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2. [ ] **Revise and resubmit. Work may proceed subject to resolution of indicated comments.**
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G-321 Document Category N/A
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416 GP&S 7-03

24590-CM-HC4-HXYG-00138-01-14
REV. 00B

SUBCONTRACT SUBMITTAL

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IQRPE REVIEW –
LOW ACTIVITY WASTE FACILITY SYSTEMS LCP AND RLD ANCILLARY EQUIPMENT

"I, John T. Baxter, have reviewed, and certified a portion of the design of a new tank system or component located at the Hanford Waste Treatment Plant, owned/operated by Department of Energy, Office of River Protection, Richland, Washington. My duties were independent review of the current design for the Low Activity Waste Facility Systems LCP and RLD Ancillary Equipment as required by the Dangerous Waste Regulations, namely, WAC 173-303-640(3) applicable paragraphs, i.e., (a) through (g)."

"I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment."

The documentation reviewed indicate that the design intent fully satisfies the requirements of the WAC.

The attached review is 10 sheets numbered 1 through 10.

JOHN T. BAXTER
STATE OF WASHINGTON
18978
REGISTERED PROFESSIONAL ENGINEER
EXPIRES: 10/28/ 04

05/06/04

John T. Baxter
Signature

05/06/2004
Date

24590-CM-HC4-HXYG-00138-01-14, REV. 00B

STRUCTURAL INTEGRITY ASSESSMENT OF THE LOW ACTIVITY WASTE FACILITY SYSTEMS LCP AND RLD ANCILLARY EQUIPMENT

COGEMA-IA-017
REV. 2

Scope	Scope of this Integrity Assessment	This integrity assessment includes: a. Ancillary equipment associated with the Plant Wash Vessel (RLD-VSL-00003) and the SBS Condensate Collection Vessel (RLD-VSL-00005) as shown on Drawing No. 24590-LAW-M6-RLD-P0001, Rev. 2. RLD-BULGE-00004 is included in the assessment of RLD system ancillary equipment. b. Ancillary equipment shown on Drawing No. 24590-LAW-M6-RLD-P0003, Rev. 1 which are floor drains and drain manifolds for process cells/areas at elevations 3'-0", 28'-0", and 48'-0" and ancillary equipment for the sump pumps in the process cells at elevation 3'-0". c. Ancillary equipment associated with the Concentrate Receipt Vessel (LCP-VSL-00001) as shown on Drawing No. 24590-LAW-M6-LCP-P0001, Rev. 2 including LCP-BULGE-00001 and LCP-BULGE-00002. d. Ancillary equipment associated with the Concentrate Receipt Vessel (LCP-VSL-00002) as shown on Drawing No. 24590-LAW-M6-LCP-P0002, Rev. 1 including LCP-BULGE-00003. Direct buried double containment underground transfer lines outside the LAW Building are considered outside the scope of this integrity assessment. They are addressed in COGEMA-IA-015.
References	Drawings, Mechanical Systems Data Sheets, and System Descriptions	24590-LAW-P1-P01T-P0002, Rev. 2, LAW Vitrification Building General Arrangement Plan at EL. 3'-0"; 24590-LAW-M6-RLD-P0001, Rev. 2, P&ID LAW Radioactive Liquid Waste Disposal System Plant Wash & SBS Condensate Collection; 24590-LAW-M6-RLD-P0003, Rev. 1, P&ID - LAW Radioactive Liquid Waste Disposal System C3/C5 Floor Drains Collection; 24590-LAW-M6-LCP-P0001, Rev. 2, P&ID - LAW Concentrate Receipt Process System Concentrate Receipt Vessel LCP-VSL-00001; 24590-LAW-M6-LCP-P0002, Rev. 1, P&ID - LAW Concentrate Receipt Process System Concentrate Receipt Vessel LCP-VSL-00002; Mechanical Systems Data Sheet: Special Vertical Centrifugal Pump 24590-LAW-MPD-RLD-00003, Rev. 1, SBS Plant Wash Vessel Discharge Pumps RLD-PMP-00001A/B; Mechanical Systems Data Sheet: Special Vertical Centrifugal Pump 24590-LAW-MPD-RLD-00005, Rev. 1, SBS Condensate Collection Vessel Discharge Pumps RLD-PMP-00003A/B; Mechanical Systems Data Sheet: Special Vertical Centrifugal Pump 24590-LAW-MPD-LCP-00001, Rev. 1, Melter 1 Concentrate Receipt Pumps LCP-PMP-00001A/B; Mechanical Systems Data Sheet: Special Vertical Centrifugal Pump 24590-LAW-MPD-LCP-00003, Rev. 1, Melter 2 Concentrate Receipt Pumps LCP-PMP-00002A/B

References	Drawings, Mechanical Systems Data Sheets, and System Descriptions	Mechanical Systems Data Sheet: Process Bulge, 24590-LAW-MXD-RLD-00002, Rev. B, Plant Item No. RLD-BULGE-00004; Mechanical Systems Data Sheet: Process Bulge, 24590-LAW-MXD-LCP-00001, Rev. B, Plant Item No. LCP-BULGE-00001; Mechanical Systems Data Sheet: Process Bulge, 24590-LAW-MXD-LCP-00002, Rev. B, Plant Item No. LCP-BULGE-00002; Mechanical Systems Data Sheet: Process Bulge, 24590-LAW-MXD-LCP-00003, Rev. B, Plant Item No. LCP-BULGE-00003; 24590-LAW-3YD-LCP-00001, Rev. 0, System Description for LAW Concentrate Receipt Process (LCP); System Description Change Notice (SDCN) No. 24590-LAW-3YN-LCP-00001 for System Description No. 24590-LAW-3YD-LCP-00001, Rev. 0; 24590-LAW-PER-J-03-002, Rev. 0, System Logic Description for the Low-Activity Waste Facility – LAW Concentrate Receipt Process System (LCP); 24590-LAW-3YD-20-00001, Rev. 0, System Description for LAW Vitrification Liquid Effluent System (RLD and NLD); 24590-LAW-PER-J-02-001, Rev. 1, System Logic Description for the Low-Activity Waste Facility – Radioactive Liquid Waste Disposal (RLD) System

Summary of Assessment

For each item of "Information Assessed" (i.e., Criteria) on the following pages, the items listed under "Source of Information" were reviewed and found to furnish adequate design controls and requirements to assure the design intent fully satisfies the WAC requirements.

	Information Assessed	Source of Information	Discussion
Design	Ancillary equipment design standards are appropriate and adequate for the equipment's intended use.	Drawings, Mechanical Systems Data Sheets, and System Descriptions listed above under References; 24590-WTP-DC-PS-01-001, Rev 2, Pipe Stress Design Criteria including "Pipe Stress Criteria" and "Span Method Criteria"; 24590-WTP-3PS-MX00-TP001, Rev. 1, Engineering Specification for Process Bulge Design and Fabrication; 24590-WTP-3PS-MPC0-TP008, Rev. 0, Engineering Specification for Vessel-Mounted Vertical Transfer Pumps – LAW Facility; ASME B31.3 Code, Process Piping, 1996 Edition, American Society of Mechanical Engineers; ASME Boiler and Pressure Vessel Code, Section VIII Rules for Construction of Pressure Vessels	The Pipe Stress Design Criteria identifies ASME B31.3 as the design code for ancillary equipment systems of the WTP. The system descriptions identify the ancillary equipment in these systems as Quality Level (QL-CM) (Commercial grade) and Seismic Category (SC-III). The Engineering Specification for Process Bulge Design and Fabrication includes requirements for general design, fabrication, project management, quality assurance, inspection and testing of Process Bulges for use in WTP facilities. The Mechanical System Data Sheets indicate that all three bulges are Quality Level (CM) and Seismic Category (SC-III). Piping within the bulges is to be designed in accordance with ASME B31.3 and the bulge Secondary Containments are to be designed in accordance with ASME B&PV code, Section VIII, Pressure Vessels, Parts 1 and 2 as applicable. The Engineering Specification for Vessel-Mounted Vertical Transfer Pumps-LAW Facility provides requirements for design and fabrication, quality assurance and inspection and performance testing of the vertical transfer pumps. The Mechanical System Data Sheets indicate that the pumps are Quality Level (CM) and Seismic Category (SC-III). These codes and standards are acceptable and adequate for the design of both the ancillary equipment and the process bulges for the intended service.
	If the ancillary equipment to be used is not built to a design standard, the design calculations demonstrate sound engineering principles of construction.	24590-WTP-DC-PS-01-001, Rev 2, Pipe Stress Design Criteria including "Pipe Stress Criteria" and "Span Method Criteria"; 24590-WTP-3PS-MX00-TP001, Rev. 1, Engineering Specification for Process Bulge Design and Fabrication; 24590-WTP-3PS-MPC0-TP008, Rev. 0, Engineering Specification for Vessel-Mounted Vertical Transfer Pumps – LAW Facility	The ancillary equipment is built to design standards. The Pipe Stress Design Criteria specifies that ancillary equipment is to be designed in accordance with ASME B31.3. The Engineering Specification for Process Bulge Design requires bulge piping to be designed to ASME B31.3 and the bulge secondary containment to be designed to ASME B&PV code, Section VIII. The Engineering Specification for Vessel-Mounted Vertical Transfer Pumps-LAW Facility provides requirements for pump design and fabrication including performance testing and hydrotesting to assure pump integrity.

	Information Assessed	Source of Information	Discussion
Design	Ancillary equipment has adequate strength at the end of its design life to withstand the operating pressure, operating temperature, thermal expansion, and seismic loads. Equipment is protected against physical damage and excessive stress due to settlement, vibration, expansion, or contraction.	24590-WTP-DC-PS-01-001, Rev 2, Pipe Stress Design Criteria including "Pipe Stress Criteria" and "Span Method Criteria"; 24590-WTP-3PS-MX00-TP001, Rev. 1, Engineering Specification for Process Bulge Design and Fabrication; 24590-WTP-3PS-MPC0-TP008, Rev. 0, Engineering Specification for Vessel-Mounted Vertical Transfer Pumps – LAW Facility; 24590-WTP-3PS-FB01-T0001, Rev. 1, Structural Design Loads for Seismic Category III & IV Equipment and Tanks; Uniform Building Code (UBC), 1997 Edition, International Conference of Building Officials; 24590-WTP-DB-ENG-01-001, Rev 1A, Basis of Design.	The Pipe Stress Design Criteria requires the use of the ASME B31.3 Code for ancillary equipment design. ASME B31.3 requires explicit consideration of operating pressure, operating temperature, thermal expansion/contraction, settlement, vibration, and corrosion allowance in the design of piping. The Engineering Specification for Process Bulge Design and Fabrication requires the bulge secondary containment to be designed in accordance with ASME B&PV Code, Section VIII requirements for a similar set of design conditions to those specified in ASME B31.3 for process piping. The Engineering Specification for Vessel-Mounted Vertical Transfer Pumps – LAW Facility lists applicable design loads for the pumps including corrosion allowance and seismic design requirements. All of the ancillary equipment is to be designed for seismic loadings in accordance with the provisions of Structural Design Loads for Seismic Category III & IV Equipment and Tanks. The Uniform Building Code is used to provide appropriate seismic design requirements for Seismic Category (SC-III) systems and components to supplement the provisions of the codes and standards listed above. The Basis of Design document specifies that mechanical equipment is to be designed for a nominal plant life of 40 years. Components in non-maintainable areas are to be designed to last the entire design life of the plant. The Engineering Specification for Vessel-Mounted Vertical Pumps specifies a 20 year design life for the vertical transfer pumps assuming periodic maintenance. These requirements and codes and standards are adequate to assure that the ancillary equipment will have adequate strength at end of life to resist all anticipated conditions.

	Information Assessed	Source of Information	Discussion
Supports	Ancillary equipment supports are adequately designed.	Mechanical Systems Data Sheets listed above under References; 24590-WTP-DC-PS-01-002, Rev 2, Pipe Support Design Criteria; 24590-WTP-PER-PS-02-001, Rev. 4, Ancillary Equipment Pipe Support Design; 24590-WTP-3PS-MX00-TP001, Rev. 1, Engineering Specification for Process Bulge Design and Fabrication; 24590-WTP-3PS-MPC0-TP008, Rev. 0, Engineering Specification for Vessel-Mounted Vertical Transfer Pumps – LAW Facility; Uniform Building Code (UBC), 1997 Edition, International Conference of Building Officials; 24590-WTP-PL-PS-01-001, Rev 1, Verification and Validation Test Plan for Bechtel's ME150 Pipe Support Family of Programs (PCFAPPS)	The Pipe Support Design Criteria document considers all loadings identified in ASME B31.3 and utilizes ASME Section III (Subsection NF and Appendix F) to supplement the requirements of ASME B31.3 for seismic design of SC-I/II and SC-III/IV pipe supports. Bounding load cases are passed to the pipe support designers from the results of the ancillary equipment piping stress analyses. Details of the seismic design methodology are discussed in the Pipe Support Design Criteria document. The Ancillary Equipment Pipe Support Design document provides summaries of applicable design requirements for various typical supports illustrated in the document. The Engineering Specification for Process Bulge Design and Fabrication includes requirements for design of supporting frames for Bulges. The Engineering Specification for Vessel-Mounted Vertical Transfer Pumps – LAW Facility provides guidance for mounting the pumps on the vessels and directions for design and analysis of the semi-remote handled support flanges. Analysis of supports is by manual calculation or approved computer programs that have been verified and validated as discussed in the reference Verification and Validation Test Plan document. These are appropriate codes and standards for design of ancillary equipment supports over the range of conditions identified for these systems. Ancillary equipment supports are to be designed to allow a minimum of heat to be transferred to the building structures (building structures not to exceed 150 deg F for concrete and 200 deg F for steel). Design standards for vessel internal equipment supports are discussed in the integrity assessment for each system vessel.

	Information Assessed	Source of Information	Discussion
Connections	Seams and connections are adequately designed.	24590-WTP-DB-ENG-01-001, Rev 1A, Basis of Design; 24590-WTP-DC-PS-01-001, Rev 2, Pipe Stress Design Criteria including "Pipe Stress Criteria" and "Span Method Criteria"; 24590-WTP-3PS-MX00-TP001, Rev. 1, Engineering Specification for Process Bulge Design and Fabrication; 24590-WTP-3PS-MPC0-TP008, Rev. 0, Engineering Specification for Vessel-Mounted Vertical Transfer Pumps – LAW Facility	The Pipe Stress Design Criteria specifies the ASME B31.3 Process Piping design code for the piping systems. Welding is to be performed in accordance with the requirements of ASME B31.3 and the ASME B&PV Code, Section IX. The Engineering Specification for Process Bulge Design and Fabrication requires that welding for the bulge secondary containment is to be performed in accordance with the requirements of ASME B&PV Code, Sections VIII and IX. The Engineering Specification for Vessel-Mounted Vertical Transfer Pumps – LAW Facility also specifies the welding requirements of the ASME B&PV Code. Flanges are to be designed in accordance with ASME B16.5 where flanged connections are allowed for ancillary equipment. These are adequate and appropriate codes and standards for design and fabrication of the ancillary equipment seams and connections for these mixed waste systems.
Frost Heave	The system will withstand the effects of frost heave.	System Descriptions and System Logic Descriptions listed above under References; 24590-WTP-DC-ST-01-001, Rev. 2, Structural Design Criteria	The LCP and RLD systems ancillary equipment considered in this assessment is located in process cells and process areas inside the LAW Vitrification Facility as discussed in the System Descriptions. The Structural Design Criteria requires that all structural foundations shall extend into the surrounding soil below the frost line to preclude frost heave. The frost line is 30 in. below grade. The LAW building foundations are not subject to frost heave; therefore, the ancillary equipment located inside the building is not subject to the effects of frost heave.

	Information Assessed	Source of Information	Discussion
Waste Characteristics	Characteristics of the waste to be stored or treated have been identified (ignitable, reactive, toxic, specific gravity, vapor pressure, flash point, temperature)	24590-WTP-PER-PR-03-001, Rev. 1, Prevention of Hydrogen Accumulation in WTP Tank Systems and Miscellaneous Treatment Unit Systems; 24590-WTP-PER-PR-03-002, Rev. 1, Toxic Vapors and Emissions from WTP Tank Systems and Miscellaneous Treatment Unit Systems	The Prevention of Hydrogen Accumulation in WTP Tank Systems and Miscellaneous Treatment Unit Systems document indicates that flammable or explosive concentrations of hydrogen are not expected in the LAW facility systems ancillary equipment. Similarly, the Toxic Vapors and Emissions from WTP Tank Systems and Miscellaneous Treatment Unit Systems document provides a summary of the LAW facility ancillary equipment design features that provide for confinement and treatment of chronically toxic vapors and emissions during normal operations, abnormal operations, and during and after a design level seismic event.
	Ancillary equipment is designed to handle the wastes with the characteristics defined above and any treatment reagents.	24590-WTP-PER-M-02-002, Rev 1, Materials for Ancillary Equipment; Drawings and System Descriptions listed above under References	Based on the System Descriptions, the only system that uses reagents to adjust the waste pH is the LAW Vitrification Liquid Effluent System (RLD) shown on Drawing No. 24590-LAW-M6-RLD-P0001, Rev. 2. The Materials for Ancillary Equipment document requires that the material selection and corrosion/erosion allowances for ancillary equipment in contact with the waste will be equal to or better than the material and corrosion allowance of the waste source vessel except as noted therein. Therefore, the material selection for the RLD system ancillary equipment has considered the use of reagents in RLD-VSL-00003 and RLD-VSL-00005.

	Information Assessed	Source of Information	Discussion
Compatibility	The pH range of the waste, waste temperature and the corrosion behavior of the structural materials are adequately addressed. Ancillary equipment material and protective coatings ensure the ancillary equipment structure is adequately protected from the corrosive effects of the waste stream and external environments. The protection is sufficient to ensure the equipment will not leak or fail for the design life of the system.	24590-WTP-DB-ENG-01-001, Rev 1A, Basis of Design; System Descriptions and System Logic Descriptions listed above under References; 24590-WTP-3PS-MPC0-TP008, Rev. 0, Engineering Specification for Vessel-Mounted Vertical Transfer Pumps – LAW Facility; 24590-WTP-PER-M-02-002, Rev 1, Materials for Ancillary Equipment; 24590-WTP-3PS-NN00-T0001, Rev 0, Engineering Specification for Hot and Anti-Sweat Thermal Insulation	The Basis of Design identifies a service design life of 40 years for the ancillary equipment. All non-maintainable items will be designed to last the life of the facility. The Engineering Specification for Vessel-Mounted Vertical Transfer Pumps – LAW Facility specifies a service design life of 20 years for the vertical transfer pumps assuming periodic maintenance. Detailed material selection (corrosion) evaluations are conducted for each vessel in the LAW facility during process design to assure a 40 year service life. The Materials for Ancillary Equipment document requires that the material selection and corrosion/erosion allowances for ancillary equipment in contact with the waste will be equal to or better than the material and corrosion allowance of the waste source vessel except as noted therein. The Thermal Insulation specification requires that all insulating materials used on the outside of ancillary equipment be pre-approved for use on austenitic stainless steel in accordance with applicable ASTM procedures and tests to preclude external corrosion of ancillary equipment. Therefore, the ancillary equipment will provide the expected design service life.

	Information Assessed	Source of Information	Discussion
Corrosion Allowance	Corrosion allowance is adequate for the intended service life of the ancillary equipment.	24590-WTP-DC-PS-01-001, Rev 2, Pipe Stress Design Criteria including "Pipe Stress Criteria" and "Span Method Criteria"; 24590-WTP-DB-ENG-01-001, Rev 1A, Basis of Design; 24590-WTP-PER-M-02-002, Rev 1, Materials for Ancillary Equipment; 24590-WTP-PER-PL-02-001, Rev. 5, Piping Material Class Description; 24590-WTP-3PS-MPC0-TP008, Rev. 0, Engineering Specification for Vessel-Mounted Vertical Transfer Pumps – LAW Facility	The Pipe Stress Design Criteria document requires use of the ASME B31.3 Code for ancillary equipment design. Consideration of corrosion, including corrosion allowance, is a mandatory requirement of ASME B31.3. A required service life of 40 years is identified in the Basis of Design. Detailed material selection (corrosion) evaluations are conducted for each vessel in the LAW facility during process design to assure a 40 year service life. The Materials for Ancillary Equipment document requires that downstream ancillary equipment is to be constructed of equal or better materials than the source vessel, and with the same corrosion allowance as the source vessel except as noted therein. The Engineering Specification for Vessel-Mounted Vertical Transfer Pumps – LAW Facility specifies a minimum design service life of 20 years for the vertical transfer pumps in lieu of a corrosion allowance. The Piping Material Class Description document lists bounding corrosion/erosion allowances for each piping material class.
Strength	Pressure controls (vents and relief valves) are adequately designed to ensure pressure relief if normal operating pressures in the vessels are exceeded.	Drawings listed above under References; 24590-WTP-DC-PS-01-001, Rev 2, Pipe Stress Design Criteria including "Pipe Stress Criteria" and "Span Method Criteria"; 24590-WTP-3PS-MX00-TP001, Rev. 1, Engineering Specification for Process Bulge Design and Fabrication; 24590-WTP-3PS-MPC0-TP008, Rev. 0, Engineering Specification for Vessel-Mounted Vertical Transfer Pumps – LAW Facility; 24590-WTP-PER-PL-02-001, Rev. 5, Piping Material Class Description	The Pipe Stress Design Criteria document specifies use of ASME B31.3 as the design code for the WTP piping. ASME B31.3 requires provision be made to safely contain or relieve any pressure to which the piping may be subjected. ASME B31.3 piping not protected by a pressure relieving device, or that can be isolated from a pressure reliving device must be designed for at least the highest pressure that can be developed. The Engineering Specification for Process Bulge Design and Fabrication requires use of the ASME B&PV code, Section VIII for design of bulge secondary confinements. Section VIII mandates pressure relief provisions for all pressure vessels. The Engineering Specification for Vessel-Mounted Vertical Transfer Pumps – LAW Facility specifies hydrotest design margins to assure pump integrity. The Piping Material Class Description document lists bounding temperature/pressure limits for each piping material class.

	Information Assessed	Source of Information	Discussion
Strength	Maximum flows and any unusual operating stresses are identified	Drawings and System Descriptions listed above under References; 24590-WTP-DC-PS-01-001, Rev 2, Pipe Stress Design Criteria including "Pipe Stress Criteria" and "Span Method Criteria"; 24590-WTP-3PS-MPC0-TP008, Rev. 0, Engineering Specification for Vessel-Mounted Vertical Transfer Pumps – LAW Facility; 24590-WTP-PER-PL-02-001, Rev. 5, Piping Material Class Description	The expected flow paths for the ancillary equipment are identified on the P&ID drawing(s) for each system. The System Descriptions for the LCP and RLD systems discuss the expected normal operating conditions and potential upset conditions for much of the ancillary equipment The Pipe Stress Design Criteria specifies the ASME B31.3 code for piping design. This code requires piping to be designed to the highest pressure that can be developed in a piping system assuring that maximum operating stresses remain within code allowables. The Engineering Specification for Vessel-Mounted Vertical Transfer Pumps – LAW Facility specifies hydrotest design margins to assure pump integrity. Piping material classes (specifications) are shown on the P&ID drawings. The Piping Material Class Description document lists the bounding pressure and temperature limits for each piping material class.
Secondary Containment	Ancillary equipment is designed with secondary containment that is constructed of materials compatible with the waste and of sufficient strength to prevent failure (pressure gradients, waste, climatic conditions, daily operations), provided with a leak-detection system, and designed to drain and remove liquids.	Drawings listed above under References; 24590-WTP-DB-ENG-01-001, Rev 1A, Basis of Design;	The ancillary equipment considered in this assessment is located in process cells and process areas inside the LAW facility. Secondary containment for ancillary equipment within the cells and areas is provided by the liners, sumps, and drains within the cells which are outside the scope of this integrity assessment. The Basis of Design requires that "Tank system ancillary equipment that manages dangerous waste shall have secondary containment." and "All secondary containments will be provided with drains and leak detection systems for detection of primary containment leaks." All of the process bulge secondary containments are equipped with open floor drains and drain lines terminating in the local process cell sumps or RLD system vessels as shown on the P&IDs.

Bechtel National, Inc.

Job No. 24590

SUPPLIER DOCUMENT STATUS

1.	Work may proceed.
2.	Revise and resubmit. Work may proceed subject to resolution of indicated comments.
3.	Revise and resubmit. Work may not proceed.
4.	Review not required. Work may proceed.

Permission to proceed does not constitute acceptance or approval of design details, calculations, analyses, test methods, or materials developed or selected by the supplier and does not relieve supplier from full compliance with contractual obligations.

REVIEWED										

G-321 Document Category N/A
[From Supplement A to G-321 (E) or G-321-V (V), as applicable, or "N/A" if SSRS is used]

Supersedes BNI Document No. N/A Rev.
[When applicable]

Accepted by DC Pfluger (Print Name) DCPfluger (Signature) 2/6/04 (Date)

Released by N/A (Print Name) (Signature) (Date)
[When applicable]

416 GP&S 6-03

24590-CM-HC4-HXYG-00138-01-00019
REV. 00A

PURCHASE ORDER SUBMITTAL

COGEMA-IA-034, Rev. 0

R10201159

IQRPE REVIEW
OF
THE LOW ACTIVITY WASTE FACILITY OFFGAS PROCESS (LOP) SYSTEM MELTER 1 AND MELTER 2 SBS CONDENSATE VESSELS (LOP-VSL-00001/2)

"I, Tarlok S. Hundal, have reviewed and certified a portion of the design of a new tank system or component located at the Hanford Waste Treatment Plant, owned/operated by Department of Energy, Office of River Protection, Richland, Washington. My duties were independent review of the current design for the Low Activity Waste Facility (LAW) Offgas Process (LOP) System Melter 1 and Melter 2 SBS Condensate Vessels (LOP-VSL-00001/2) as required by The Dangerous Waste Regulations, namely, WAC 173-303-640(3) applicable paragraphs [i.e., (a) through (g)]."

"I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment."

The documentation reviewed indicates that the design intent fully satisfies the requirements of the WAC.

The attached review is six (6) pages numbered one (1) through six (6).

TARLOK SINGH HUNDAL
STATE OF WASHINGTON
20213
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES: 02/15/06

T S Hundal
Signature

2-4-04
Date

RPP-WTP
RECEIVED
FEB 05 2004
BY PDC

STRUCTURAL INTEGRITY ASSESSMENT OF THE LOW ACTIVITY WASTE FACILITY OFFGAS PROCESS (LOP) SYSTEM MELTER 1 AND MELTER 2 SBS CONDENSATE VESSELS (LOP-VSL-00001/2)

COGEMA-IA-034
Rev. 0

Scope	Scope of this Integrity Assessment	This Integrity Assessment includes two LAW LOP Melter 1 & Melter 2 SBS Condensate Vessels: LOP-VSL-00001/2 including their appurtenances, located in cells L-0123/L0124 respectively, at Elevation 3'-0" in the LAW Vitrification Building.
References	Specifications, Drawings and Mechanical Data Sheets	The following Specifications are listed in Material Requisition No. 24590-QL-MRD-MVA0-00002, Rev. 1 (including Supplement Nos. S01 thru S08 to Rev. 1 of the Material Requisition): Engineering Specification for Pressure Vessel Design and Fabrication; Engineering Specification for Pressure Vessel Fatigue Analysis; Specification for Welding of Pressure Vessels, Heat Exchangers and Boilers; General Specification for Supplier Quality Assurance Program Requirements; Specification for Positive Material Identification (PMI); General Specification for Packing, Shipping, Handling, and Storage Requirements; Engineering Specification for Seismic Qualification Criteria for Pressure Vessels; Engineering Specification for Structural Design Loads for Seismic Category III & IV Equipment and Tanks. Drawings: 24590-LAW-MV-LOP-00001, Rev. 0, Equipment Assembly LAW Melter 1 SBS Condensate Vessel (LOP-VSL-00001) (Q); 24590-LAW-MV-LOP-00002, Rev. 0, Equipment Assembly LAW Melter 2 SBS Condensate Vessel (LOP-VSL-00002) (Q); 24590-LAW-P1-P01T-P0002, Rev. 2, LAW Vitrification Building General Arrangement Plan at El. 3'-0"; 24590-LAW-P1-P01T-P0010, Rev. 3, LAW Vitrification Building General Arrangement Section K-K and L-L; 24590-LAW-M5-V17T-P0007, Rev. 0, Process Flow Diagram LAW Melter 1 Primary Offgas Treatment System (System LOP); 24590-LAW-M5-V17T-P0008, Rev. 0, Process Flow Diagram LAW Melter 2 Primary Offgas Treatment System (System LOP); 24590-LAW-M6-LOP-00001, Rev. 0, P & ID-LAW Primary Offgas Process System Melter 1 (Q); 24590-LAW-M6-LOP-00002, Rev. 0, P & ID-LAW Primary Offgas Process System Melter 2 (Q). Mechanical Data Sheets: 24590-LAW-MVD-LOP-00004, Rev.0, LAW Melter 1 SBS Condensate Vessel (LOP-VSL-00001); 24590-LAW-MVD-LOP-00005, Rev.0, LAW Melter 2 SBS Condensate Vessel (LOP-VSL-00002).
Summary of Assessment		For each item of "Information Assessed" (i.e., Criteria) on the following pages, the items listed under "Source of Information" were reviewed and found to furnish adequate design controls and requirements to ensure the design intent fully satisfies the requirements of Washington Administrative Code, WAC-173-303-640, *Dangerous Waste Regulations* for Tank Systems.

	Information Assessed	Source of Information	Assessment
Design	Vessel design standards are appropriate and adequate for the vessel's intended use.	Specifications listed under Material Requisition, Drawings, and Mechanical Data Sheets listed above under References; 24590-LAW-3YD-LOP-00001, Rev. 0, System Description for LOP and LVP: LAW Melter Offgas.	The LAW LOP system Melter 1 and Melter 2 SBS Condensate Vessels, LOP-VSL-00001/2 and their appurtenances are to be designed to the ASME Section VIII, Division 1 rules which are appropriate for pressure vessels operating with mixed waste solutions over the pressure and temperature ranges specified for these vessels. Supplementary requirements are specified in the Engineering Specification for Pressure Vessel Design and Fabrication. Supplementary requirements address pressure vessel, positive material identification, lifting attachment design, equipment drop evaluation, fabrication tolerances, acceptable welding procedures for the vessel and appurtenances, welder qualifications and testing records, NDE inspections and records, and lifting, packaging, shipping, handling and storage requirements. The vessels are subjected to cyclic loading. The Specification for Fatigue Analysis requires the use of ASME Section VIII, Division 2 rules for vessel components with a high number of load cycles. These are adequate and acceptable design standards for the intended use of the vessels. The LOP-VSL-00001/2 are vertical vessels with a 144 in. ID and a height of 98 in. from the bottom tangent line to the top tangent line. The vessels' top and bottom Flanged & Dished (F & D) heads and shells are built with 5/8" thick plate. Each vessel is supported on a cylindrical skirt (1/2" thick plate by approx. 2'-8" high) which in turn is supported on a base plate anchored to the concrete floor at Elev. 3'-0". Each vessel has internal equipment such as an eductor, spay nozzle, and piping that are supported from the vessel's top head. Material for the shell, top and bottom heads, and vessel's internal equipment is Hastelloy C-22 (SB-575 N06022) and is hereafter referred to as C-22. Each vessel's shell and bottom head has an external cooling coil jacket made of SA-312 304 stainless steel (0.030% maximum carbon content) half-pipe section. The supporting skirt is specified as SA-240 304 stainless steel plate (0.030% maximum carbon content) and is hereafter referred to as 304. The operating volume is to be about 7,400 gallons and the total internal volume is to be about 9,050 gallons.

	Information Assessed	Source of Information	Assessment
Design	If a non-standard vessel is to be used, the design calculations demonstrate sound engineering principles of construction.	Specifications listed under Material Requisition, Drawings, and Mechanical Data Sheets listed above under References.	The LOP Melter 1 and Melter 2 SBS Condensate Vessels, LOP-VSL-00001/2 are standard ASME Section VIII, Div. 1 vessels. The Mechanical Data Sheets require that the ASME Section VIII, Division 1 vessels be delivered after design, fabrication, inspection and testing with an ASME code stamp and that the vessels be nationally registered. Supplemental design information is provided by the reference documents listed in the Source of Information column for utilizing sound engineering principles of construction of the vessels.
	Vessel has adequate strength, after consideration of the corrosion allowance, to withstand the operating pressure, operating temperature, and seismic loads.	Specifications listed under Material Requisition, Drawings, and Mechanical Data Sheets listed above under References; 24590-LAW-3YD-LOP-00001, Rev. 0, System Description for LOP and LVP: LAW Melter Offgas.	The Mechanical Data Sheets identify each vessel's operating pressure and temperature ranges, the materials selected for the vessel, the corrosion allowance, the vessel quality level, and its seismic category. The design specification for the vessel requires specific consideration of the operating pressures and temperatures and seismic loads in the design process. ASME Section VIII, Div. 1 requires that the corrosion allowance thickness shall be excluded from the nominal vessel thickness when evaluating the adequacy of the vessel components to sustain the applicable loads at end of life. The Engineering Specification for Seismic Qualification Criteria for Pressure Vessels adopts ASME Section VIII, Div. 2 design rules to address seismic design and analysis of the vessel and ASME Section VIII, Div.1 for the design of the vessel supports. Detailed requirements for seismic load determination are furnished in the Specification for Structural Design Loads for Seismic Category III & IV Equipment and Tanks. These codes and standards are adequate and appropriate for the design of the LOP vessels to withstand operating pressure and temperature loads and seismic loads for the specified design life.

	Information Assessed	Source of Information	Assessment
Foundation	Vessel foundation will maintain the load of a full vessel.	Specifications listed under Material Requisition above under References; 24590-WTP-DB-ENG-01-001, Rev. 1A, Basis of Design.	The Engineering Specification for Pressure Vessel Design and Fabrication requires the use of ASME BPV Code, Section VIII, Division 1 for the design of the vessel supports. This code ensures an adequate design for the vessel supports. Chapter 14 of the Basis of Design document requires that the vessel foundation design must be adequate to support the loads from full vessels.
	If in an area subject to flooding, the vessel is anchored.	Specifications listed under Material Requisition under References.	Buoyant forces of an empty vessel in a flooded room are a mandatory standard design load case in the Specification for Pressure Vessel Design and Fabrication.
	Vessel system will withstand the effects of frost heave.	24590-WTP-DB-ENG-01-001, Rev. 1A, Basis of Design.	The Basis of Design document requires that all structural foundations for outdoor equipment to extend a distance below grade that exceeds the 30" depth of the frost line. The vessels are located inside/interior of the building at Elev. 3'-0" level, and the building's lower level floor is at Elev. (-) 21'-0", therefore, the vessels' foundations are not subject to frost heave.

	Information Assessed	Source of Information	Assessment
Waste Characteristics	Characteristics of the waste to be stored or treated have been identified (ignitable, reactive, toxic, specific gravity, vapor pressure, flash point, storage temperature)	Mechanical Data Sheets listed above under References; Plant Item Material Selection Data Sheet, 24590-LAW-N1D-LOP-P0002, Rev. 0, LOP-VSL-00001 & LOP-VSL-00002 (LAW) Melter 1 & Melter 2 SBS Condensate Vessel; 24590-WTP-PSAR-ESH-01-002-03, Rev. 1, Preliminary Safety Analysis Report to Support Construction Authorization: LAW Facility Specific Information; Ecology Permit # WA7890008967, *Dangerous Waste Portion of the Hanford Facility Resource Conservation and Recovery Act Permit for the Treatment, Storage, and Disposal of Dangerous Waste,* Chapter 10, and Attachment 51, "Waste Treatment and Immobilization Plant."	The Mechanical Data Sheets present the waste specific gravity, storage temperatures and pressures. The Plant Item Material Selection Data Sheet addresses the pH range and chemical composition of the waste to select appropriate vessel materials and specify the corrosion allowance. Other waste characteristics that are hazardous, such as ignitability, reactivity, and toxicity are addressed by the Preliminary Safety Analysis Report for the LAW Vitrification Building and in Part A of the Permit, as an integral part of the design process. The LOP vessels provide primary confinement of the waste during normal operations, abnormal operations and during and after a Design Basis Earthquake. Each vessel continually pumps condensate to SBS column vessel (LOP-SCB-00001/2) to maintain their operation level. The recirculation process helps prevent the build-up of any flammable gases. The vessels are grounded to control ignition sources.
	Vessel is designed to store or treat the wastes with the characteristics defined above and any treatment reagents.	Plant Item Material Selection Data Sheet, 24590-LAW-N1D-LOP-P0002, Rev. 0, LOP-VSL-00001 & LOP-VSL-00002 (LAW) Melter 1 & Melter 2 SBS Condensate Vessel; 24590-LAW-3YD-LOP-00001, Rev. 0, System Description for LOP and LVP: LAW Melter Offgas.	The Plant Item Material Selection Data Sheet demonstrates that the vessels are designed to process the wastes discussed above. The System Description discusses normal and abnormal operations for the LOP vessels. The solids accumulated in the vessels are suspended by the Eductors (LOP-EDUC-00001/2) powered by a side stream from the recirculation line. The cooled condensate is recycled via purge pumps (LOP-PMP-00001/4) to the SBS column vessels.
	The waste types are compatible with each other.	24590-LAW-3YD-LOP-00001, Rev. 0, System Description for LOP and LVP: LAW Melter Offgas.	The System Description for the LAW (LOP) does not describe any operations where incompatible wastes are mixed in these vessels for processing. The LOP system vessels function primarily to process byproduct offgas from the LAW Melters concentrated feed waste received from the Pretreatment Facility (PTF).

	Information Assessed	Source of Information	Assessment
Corrosion Protection	Vessel material and protective coatings ensure the vessel structure is adequately protected from the corrosive effects of the waste stream and external environments (expected to not leak or fail for the design life of the system)	Drawings and Mechanical Data Sheets listed above under References; Plant Item Material Selection Data Sheet, 24590-LAW-N1D-LOP-P0002, Rev. 0, LOP-VSL-00001 & LOP-VSL-00002 (LAW) Melter 1 & Melter 2 SBS Condensate Vessel; 24590-LAW-3YD-LOP-00001, Rev. 0, System Description for LOP and LVP: LAW Melter Offgas.	The Plant Item Material Selection Data Sheet shows that the LAW Submerged Bed Scrubber vessels, LOP-VSL-00001/2 normally operate at a pH range of 2 to 7, and at a temperature range of 104°F to 158°F. The vessels are designed for 15 psig pressure and a temperature of 237°F. Other pertinent vessel operation and design information is provided in the Mechanical Data Sheets. The material selected is C-22 and a corrosion allowance of 0.08 in. The LOP vessels are located in the LAW facility cells (L-0123/L-0124) at Elevation 3'-0". Each vessel's support skirt material is 304. Each cell is equipped with a sump pump to remove any leakage. Therefore, the cells should remain dry during normal operations which will limit external corrosion of the vessel over the facility design life.
Corrosion Allowance	Corrosion allowance is adequate for the intended service life of the vessel.	Mechanical Data Sheets listed above under References; Plant Item Material Selection Data Sheet, 24590-LAW-N1D-LOP-P0002, Rev. 0, LOP-VSL-00001 & LOP-VSL-00002 (LAW) Melter 1 & Melter 2 SBS Condensate Vessel.	The bases for the LOP vessel's material selection and corrosion allowance are furnished in the Plant Item Material Selection Data Sheet. Selection of C-22 material for the vessels with a corrosion allowance of 0.08 in. for a service life of 40 years is adequate and appropriate. The material selections and corrosion allowances are carried forward to the Mechanical Data Sheets, consistently and correctly.
Pressure Relief	Pressure controls (vents and relief valves) are adequately designed to ensure pressure relief if normal operating pressures in the vessel are exceeded.	Drawings listed above under References; 24590-LAW-3YD-LOP-00001, Rev. 0, System Description for LOP and LVP: LAW Melter Offgas.	The LOP Melter 1 and Melter 2 SBS Condensate Vessels, LOP-VSL-00001/2 are designed for continuous condensate pump out to SBS Column Vessels (LOP-SCB-00001/2) which are also located at Elevation 3'-0", as shown on the drawings and described in the System Description document. The vessels are vented via the 2"diameter outlet lines to the SBS Column Vessels (LOP-SCB-00001/2) into the main offgas discharge pipe. These vents prevent the over pressurization of the SBS Condensate Vessels.

Bechtel National, Inc.

Job No. 24590

SUPPLIER DOCUMENT STATUS

1	**Work may proceed.**
2.	**Revise and resubmit. Work may proceed subject to resolution of indicated comments.**
3.	**Revise and resubmit. Work may not proceed.**
4.	**Review not required. Work may proceed.**

Permission to proceed does not constitute acceptance or approval of design details, calculations, analyses, test methods, or materials developed or selected by the supplier and does not relieve supplier from full compliance with contractual obligations.

REVIEWED

G-321 Document Category N/A
[From Supplement A to G-321 (E) or G-321-V (V), as applicable, or "N/A" if SSRS is used]

Supersedes BNI Document No. N/A Rev.
[When applicable]

Accepted by DCPfluger (Print Name) DCPfluger (Signature) 2/6/04 (Date)

Released by N/A (Print Name) (Signature) (Date)
[When applicable]

416 GP&S 6-03

24590-CM-HC4-HXYG-00138-02-00011
REV. 00A

PURCHASE ORDER SUBMITTAL

Best Available Copy

R10201161

IQRPE REVIEW
OF
THE LOW ACTIVITY WASTE FACILITY OFFGAS PROCESS (LOP) SYSTEM SUBMERGED BED SCRUBBERS (LOP-SCB-00001/2) AND WET ELECTROSTATIC PRECIPITATORS (LOP-WESP-00001/2)

"I, Tarlok S. Hundal, have reviewed and certified a portion of the design of a new tank system or component located at the Hanford Waste Treatment Plant, owned/operated by Department of Energy, Office of River Protection, Richland, Washington. My duties were independent review of the current design for the Low Activity Waste Facility (LAW) Offgas Process (LOP) System Submerged Bed Scrubbers (LOP-SCB-00001/2) and Wet Electrostatic Precipitators (LOP-WESP-00001/2) as required by The Dangerous Waste Regulations, namely, WAC 173-303-640(3) applicable paragraphs [i.e., (a) through (g)]."

"I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment."

The documentation reviewed indicates that the design intent fully satisfies the requirements of the WAC.

The attached review is 12 pages numbered one (1) through twelve (12).

TARLOK SINGH HUNDAL
STATE OF WASHINGTON
20213
REGISTERED
PROFESSIONAL ENGINEER
EXPIRES: 02/15/06

TSHundal
Signature

2-4-04
Date

RPP-WTP
RECEIVED
FEB 0 5 2004
BY PDC

STRUCTURAL INTEGRITY ASSESSMENT
OF
THE LOW ACTIVITY WASTE FACILITY OFFGAS PROCESS (LOP) SYSTEM SUBMERGED BED SCRUBBERS (LOP-SCB-00001/2) AND WET ELECTROSTATIC PRECIPITATORS (LOP-WESP-00001/2)

COGEMA-IA-033
Rev. 0

Scope	Scope of this Integrity Assessment	This Integrity Assessment includes two LOP Submerged Bed Scrubbers (SBS): LOP-SCB-00001/2 including their appurtenances, located in cells L-0123/L0124 respectively, at Elevation 3'-0" in the LAW Vitrification Building.
References	Specifications, Drawings and Mechanical Data Sheet	The following Specifications are listed in Material Requisition No. 24590-QL-MRA-MKAS-00001, Rev. 5 Engineering Specification for Pressure Vessel Design and Fabrication; Engineering Specification for Pressure Vessel Fatigue Analysis; Specification for Welding of Pressure Vessels, Heat Exchangers and Boilers; General Specification for Supplier Quality Assurance Program Requirements; Specification for Positive Material Identification (PMI); General Specification for Packing, Shipping, Handling, and Storage Requirements; Engineering Specification for Seismic Qualification Criteria for Pressure Vessels; Engineering Specification for Structural Design Loads for Seismic Category III & IV Equipment and Tanks. Drawings: 24590-LAW-MK-LOP-00001001,-00001002, -00001003, all Rev. 0, Equipment Assembly LAW Submerged Bed Scrubber (LOP-SCB-00001/2) Q (including Drawing Change Notices listed in the above referenced Material Requisition No.); 24590-LAW-P1-P01T-P0002, Rev. 2, LAW Vitrification Building General Arrangement Plan at El. 3'-0"; 24590-LAW-P1-P01T-P0007, Rev. 2, LAW Vitrification Building General Arrangement Section A-A, B-B, and C-C; 24590-LAW-P1-P01T-P0010, Rev. 3, LAW Vitrification Building General Arrangement Section K-K and L-L; 24590-LAW-M5-V17T-P0007, Rev. 0, Process Flow Diagram LAW Melter 1 Primary Offgas Treatment System (System LOP); 24590-LAW-M5-V17T-P0008, Rev. 0, Process Flow Diagram LAW Melter 2 Primary Offgas Treatment System (System LOP); 24590-LAW-M6-LOP-00001, Rev. 1, P & ID-LAW Primary Offgas Process System Melter 1 (Q); 24590-LAW-M6-LOP-00002, Rev. 1, P & ID-LAW Primary Offgas Process System Melter 2 (Q). Mechanical Data Sheet: 24590-LAW-MKD-LOP-00008, Rev.1, Melter 1 and 2 Submerged Bed Scrubbers (LOP-SCB-00001/2).
Summary of Assessment		For each item of "Information Assessed" (i.e., Criteria) on the following pages, the items listed under "Source of Information" were reviewed and found to furnish adequate design controls and requirements to ensure the design intent fully satisfies the requirements of Washington Administrative Code, WAC-173-303-640, *Dangerous Waste Regulations* for Tank Systems.

	Information Assessed	Source of Information	Assessment
Design	Vessel design standards are appropriate and adequate for the vessel's intended use.	Specifications listed under Material Requisition, Drawings, and Mechanical Data Sheet listed above under References; 24590-LAW-3YD-LOP-00001, Rev. 0, System Description for LOP and LVP: LAW Melter Offgas.	The LOP system Submerged Bed Scrubbers, LOP-SCB-00001/2 and their appurtenances are to be designed to the ASME Section VIII, Division 1 rules which are appropriate for pressure vessels operating with mixed waste solutions over the pressure and temperature ranges specified for these plant items. Supplementary requirements are specified in the Engineering Specification for Pressure Vessel Design and Fabrication. Supplementary requirements address pressure vessel, positive material identification, lifting attachment design, equipment drop evaluation, fabrication tolerances, acceptable welding procedures for the vessel and appurtenances, welder qualifications and testing records, NDE inspections and records, and lifting, packaging, shipping, handling and storage requirements. The vessels are subjected to cyclic loading. The Specification for Fatigue Analysis requires the use of ASME Section VIII, Division 2 rules for vessel components with a high number of load cycles. These are adequate and acceptable design standards for the intended use of these SBSs. The LAW Submerged Bed Scrubbers, LOP-SCB-00001/2 are vertical with a 120 in. ID and a height of 78 in. from bottom tangent line to top tangent line. The top and bottom Flanged & Dished (F & D) heads and shell are built with minimum 5/8" thick plate. Each SBS is supported on a cylindrical skirt (1/2" minimum thick plate by approx. 5'-7" high) which in turn is supported on a base plate anchored to the concrete floor at Elev. 3'-0". The SBSs have internal equipment such as coil and scrubber bed supported from the top head. Material for the shell, top and bottom heads, and internal equipment is Hastelloy C-22 (SB-575 N06022) and is hereafter referred to as C-22. The vessel's shell and bottom head has an external cooling coil jacket made of SA-312 304 stainless steel half-pipe section. The supporting skirt is specified as SA-240 304 stainless steel plate (0.030% maximum carbon content) and is hereafter referred to as 304. The operating volume is to be about 3,690 gallons and the total internal volume is to be about 4,950 gallons.

	Information Assessed	Source of Information	Assessment
Design	If a non-standard vessel is to be used, the design calculations demonstrate sound engineering principles of construction.	Specifications listed under Material Requisition, Drawings, and Mechanical Data Sheet listed above under References.	The LOP Submerged Bed Scrubbers, LOP-SCB-00001/2 are standard ASME Section VIII vessels. The Mechanical Data Sheet requires that the ASME Section VIII, Division 1 plant items be delivered after design, fabrication, inspection and testing with an ASME code stamp and be nationally registered. Supplemental design information is provided by the reference documents listed in the Source of Information column for utilizing sound engineering principles of construction of the vessels.
	Vessel has adequate strength, after consideration of the corrosion allowance, to withstand the operating pressure, operating temperature, and seismic loads.	Specifications listed under Material Requisition, Drawings, and Mechanical Data Sheet listed above under References; 24590-LAW-3YD-LOP-00001, Rev. 0, System Description for LOP and LVP: LAW Melter Offgas.	The Mechanical Data Sheet identifies SBSs' (including appurtenances) operating pressure and temperature ranges, the materials selected for the vessel, the corrosion allowance, and the vessel quality level which determines the requirements for seismic design. The specifications require specific consideration of the operating pressures and temperatures and seismic loads in the design process. ASME Section VIII, Div. 1 requires that corrosion allowance thickness shall be excluded from nominal vessel thickness when evaluating the adequacy of vessel components for these loads at end of life. The Engineering Specification for Seismic Qualification Criteria for Pressure Vessels adopts ASME Section VIII, Div. 2 design rules to address seismic design and analysis of the SBS and ASME Section VIII, Div.1 for supports. Detailed requirements for seismic load determination are furnished in the Specification for Structural Design Loads for Seismic Category III & IV Equipment and Tanks. These codes and standards are adequate and appropriate for design of the SBS to withstand operating pressure and temperature loads and seismic loads for the specified design life.

	Information Assessed	Source of Information	Assessment
Foundation	Vessel foundation will maintain the load of a full vessel.	Specifications listed under Material Requisition above under References; 24590-WTP-DB-ENG-01-001, Rev. 1A, Basis of Design.	The Engineering Specification for Pressure Vessel Design and Fabrication requires the use of ASME BPV Code, Section VIII, Division 1 for the design of the SBS supports. This code ensures an adequate design for the SBS supports. Chapter 14 of the Basis of Design document requires that the foundation for each plant item be adequate to support the loads from full vessels.
	If in an area subject to flooding, the vessel is anchored.	Specifications listed under Material Requisition under References.	Buoyant forces of an empty vessel in a flooded room are a mandatory standard design load case in the Specification for Pressure Vessel Design and Fabrication.
	Vessel system will withstand the effects of frost heave.	24590-WTP-DB-ENG-01-001, Rev. 1A, Basis of Design.	The Basis of Design document requires that all structural foundations for outdoor equipment to extend a distance below grade that exceeds the 30" depth of the frost line. The SBSs are located inside/interior of the building at Elev. 3'-0" level, and the building's lower level floor is at Elev. (-) 21'-0", therefore, the foundations are not subject to frost heave.

	Information Assessed	Source of Information	Assessment
Waste Characteristics	Characteristics of the waste to be stored or treated have been identified (ignitable, reactive, toxic, specific gravity, vapor pressure, flash point, storage temperature)	Mechanical Data Sheet listed above under References; Plant Item Material Selection Data Sheet, 24590-LAW-N1D-LOP-P0001, Rev. 0, LOP-SCB-00001/2 (LAW) Melter 1 and Melter 2 Submerged Bed Scrubbers (SBS); 24590-WTP-PSAR-ESH-01-002-03, Rev. 1, Preliminary Safety Analysis Report to Support Construction Authorization: LAW Facility Specific Information; Ecology Permit # WA7890008967, *Dangerous Waste Portion of the Hanford Facility Resource Conservation and Recovery Act Permit for the Treatment, Storage, and Disposal of Dangerous Waste,* Chapter 10, and Attachment 51, "Waste Treatment and Immobilization Plant."	The Mechanical Data Sheet presents the waste specific gravity, storage temperatures and pressures. The Plant Item Material Selection Data Sheet addresses the pH range and chemical composition of the waste to select appropriate materials and specify the corrosion allowance. Other waste characteristics that are hazardous, such as ignitability, reactivity, and toxicity are addressed by the Preliminary Safety Analysis Report for the LAW Vitrification Building and in Part A of the Permit as an integral part of the design process. The SBSs provide primary confinement of the waste during normal operations, abnormal operations and during and after a Design Basis Earthquake. Each vessel continually discharges offgas through the outlet line at its top and the liquid circulation helps prevent the build-up of any flammable gases. These plant items are grounded to control ignition sources.
	Vessel is designed to store or treat the wastes with the characteristics defined above and any treatment reagents.	Plant Item Material Selection Data Sheet, 24590-LAW-N1D-LOP-P0001, Rev. 0, LOP-SCB-00001/2 (LAW) Melter 1 and Melter 2 Submerged Bed Scrubbers (SBS); 24590-LAW-3YD-LOP-00001, Rev. 0, System Description for LOP and LVP: LAW Melter Offgas.	The Plant Item Material Selection Data Sheet demonstrates that the vessel is designed to process the wastes discussed above. The System Description discusses normal and abnormal operations for the SBSs. To help remove the solids the re-circulated stream is pumped through 8 lances that agitate the bottom of the SBS column and consolidate the solids near the pump suction.
	The waste types are compatible with each other.	24590-LAW-3YD-LOP-00001, Rev. 0, System Description for LOP and LVP: LAW Melter Offgas.	The System Description for the LAW (LOP) does not describe any operations where incompatible wastes are mixed in the SBSs for processing. They function primarily to process byproduct offgas from the LAW melters concentrated feed waste received from the Pretreatment Facility (PTF).

	Information Assessed	Source of Information	Assessment
Corrosion Protection	Vessel material and protective coatings ensure the vessel structure is adequately protected from the corrosive effects of the waste stream and external environments (expected to not leak or fail for the design life of the system)	Drawings and Mechanical Data Sheet listed above under References; Plant Item Material Selection Data Sheet; 24590-LAW-N1D-LOP-P0001, Rev. 0, LOP-SCB-00001/2 (LAW) Melter 1 and Melter 2 Submerged Bed Scrubbers (SBS); 24590-LAW-3YD-LOP-00001, Rev. 0, System Description for LOP and LVP: LAW Melter Offgas.	The Plant Item Material Selection Data Sheet shows that the LAW Submerged Bed Scrubbers, LOP-SCB-00001/2 normally operate at a pH range of 3 to 8 and at a temperature of about 122°F. They are designed for 15 psig pressure and a temperature of 237 °F. Other pertinent vessel operation and design information is provided in the Mechanical Data Sheet. The material selected is C-22 and a corrosion allowance of 0.04 in. The SBSs are located in the LAW cells (L-0123/L-0124) at Elevation 3'-0". The vessel's support skirt material is 304. This cell is equipped with a sump to pump out any leaks. Therefore, the cell should remain dry during normal operations which will limit external corrosion of the vessel over the facility design life.
Corrosion Allowance	Corrosion allowance is adequate for the intended service life of the vessel.	Mechanical Data Sheet listed above under References; Plant Item Material Selection Data Sheet; 24590-LAW-N1D-LOP-P0001, Rev. 0, LOP-SCB-00001/2 (LAW) Melter 1 and Melter 2 Submerged Bed Scrubbers (SBS).	The bases for the SBSs' material selection and corrosion allowance are furnished in the Plant Item Material Selection Data Sheet. Selection of C-22 and 304 materials with a corrosion allowance of 0.04 in. for a service life of 40 years is adequate and appropriate. The material selections and corrosion allowances are carried forward to the Mechanical Data Sheet, consistently and correctly.
Pressure Relief	Pressure controls (vents and relief valves) are adequately designed to ensure pressure relief if normal operating pressures in the vessel are exceeded.	Drawings listed above under References; 24590-LAW-3YD-LOP-00001, Rev. 0, System Description for LOP and LVP: LAW Melter Offgas.	The LOP Submerged Bed Scrubbers , LOP-SCB-00001/2 are designed for unrestricted continuous liquid overflow through two 4" diameter lines to the SBS Condensate Vessels (LOP-VSL-00001/2) which are also located at Elevation 3'-0", as shown on the drawings and described in the System Description document. The offgas also flows unrestrictedly via the 10" diameter outlet lines to the LAW Wet Electrostatic Precipitators (LOP-WESP-00001/2). The unrestricted liquid overflow and offgas discharge prevent the over pressurization of the Scrubbers.

Scope	Scope of this Integrity Assessment	This Integrity Assessment includes two LOP Wet Electrostatic Precipitators: LOP-WESP-00001/2 including their appurtenances, located in cells L-0123/L0124 respectively, at Elevation 3'-0" in the LAW Vitrification Building.
References	Specifications and Drawings	The following Specifications are listed in Material Requisition No. 24590-QL-MRA-MKE0-00001, Rev. 4 (including MRS No. S001 to Rev. 4): Engineering Specification for Pressure Vessel Design and Fabrication; Specification for Welding of Pressure Vessels, Heat Exchangers and Boilers; General Specification for Supplier Quality Assurance Program Requirements; Specification for Positive Material Identification (PMI); General Specification for Packing, Shipping, Handling, and Storage Requirements; Engineering Specification for Seismic Qualification Criteria for Pressure Vessels; Engineering Specification for Structural Design Loads for Seismic Category III & IV Equipment and Tanks. Engineering Specification for Wet Electrostatic Precipitators (WESPs), (including SCN No. 24590-WTP-3PN-MKE0-00001). Drawings: 24590-LAW-P1-P01T-P0002, Rev. 2, LAW Vitrification Building General Arrangement Plan at El. 3'-0"; 24590-LAW-P1-P01T-P0007, Rev. 2, LAW Vitrification Building General Arrangement Section A-A, B-B, and C-C; 24590-LAW-P1-P01T-P0010, Rev. 3, LAW Vitrification Building General Arrangement Section K-K and L-L; 24590-LAW-M5-V17T-P0007, Rev. 0, Process Flow Diagram LAW Melter 1 Primary Offgas Treatment System (System LOP); 24590-LAW-M5-V17T-P0008, Rev. 0, Process Flow Diagram LAW Melter 2 Primary Offgas Treatment System (System LOP); 24590-LAW-M6-LOP-00001, Rev. 1, P & ID-LAW Primary Offgas Process System Melter 1 (Q); 24590-LAW-M6-LOP-00002, Rev. 1, P & ID-LAW Primary Offgas Process System Melter 2 (Q);
Summary of Assessment		For each item of "Information Assessed" (i.e., Criteria) on the following pages, the items listed under "Source of Information" were reviewed and found to furnish adequate design controls and requirements to ensure the design intent fully satisfies the requirements of Washington Administrative Code, WAC-173-303-640, *Dangerous Waste Regulations* for Tank Systems.

	Information Assessed	Source of Information	Assessment
Design	Vessel design standards are appropriate and adequate for the vessel's intended use.	Specifications listed under Material Requisition and Drawings listed above under References; 24590-LAW-3YD-LOP-00001, Rev. 0, System Description for LOP and LVP: LAW Melter Offgas.	The LOP system Wet Electrostatic Precipitators, LOP-WESP-00001/2 including appurtenances are to be designed to the ASME Section VIII, Division 1 rules which are appropriate for pressure vessels operating with mixed waste solutions over the pressure and temperature ranges specified for these plant items. Supplementary requirements are specified in the Engineering Specification for Pressure Vessel Design and Fabrication. Supplementary requirements address pressure vessel, positive material identification, lifting attachment design, equipment drop evaluation, fabrication tolerances, acceptable welding procedures for the vessel and appurtenances, welder qualifications and testing records, NDE inspections and records, and lifting, packaging, shipping, handling and storage requirements. These are adequate and acceptable design standards for the intended use of these plant items. The Specification for the LAW Wet Electrostatic Precipitators show that the LOP-WESP-00001/2 are vertical with a 8'-0" OD and a height of 21'-6" from bottom of skirt to the top. Each WESP is to be supported on a skirt which in turn is to be supported on a base plate anchored to the concrete floor at Elev. 3'-0". Material specified for the vessel is 6% Molybdenum stainless steel alloy (e.g., AL-6XN) with 0.04" corrosion allowance and is hereafter referred to as 6% Mo. The material for supporting skirt plate is specified as SA-240 304 or 316 stainless steel (0.030% maximum carbon content) and is hereafter referred to as 304 or 316.

	Information Assessed	Source of Information	Assessment
Design	If a non-standard vessel is to be used, the design calculations demonstrate sound engineering principles of construction.	Specifications listed under Material Requisition and Drawings listed above under References.	The LOP Wet Electrostatic Precipitators, LOP-WESP-00001/2 are standard ASME Section VIII, Division 1 vessels. The Specification for the WESPs requires that the ASME Section VIII, Division 1 plant items be delivered after design, fabrication, inspection and testing with an ASME code stamp and be nationally registered. Supplemental design information is provided by the reference documents listed in the Source of Information column for utilizing sound engineering principles of construction of the WESPs.
Design	Vessel has adequate strength, after consideration of the corrosion allowance, to withstand the operating pressure, operating temperature, and seismic loads.	Specifications listed under Material Requisition and Drawings listed above under References; 24590-LAW-3YD-LOP-00001, Rev. 0, System Description for LOP and LVP: LAW Melter Offgas.	The Specification for the WESPs identifies their operating pressure and temperature ranges, the materials selected for the vessel, the corrosion allowance, and the vessel quality level which determines the requirements for seismic design. The specifications require specific consideration of the operating pressures and temperatures and seismic loads in the design process. ASME Section VIII, Div. 1 requires that corrosion allowance thickness shall be excluded from nominal vessel thickness when evaluating the adequacy of vessel components for these loads at end of life. The Engineering Specification for Seismic Qualification Criteria for Pressure Vessels adopts ASME Section VIII, Div. 2 design rules to address seismic design and analysis of the WESP and ASME Section VIII, Div.1 for the design of the vessel supports. Detailed requirements for seismic load determination are furnished in the Specification for Structural Design Loads for Seismic Category III & IV Equipment and Tanks. These codes and standards are adequate and appropriate for design of the WESP to withstand operating pressure and temperature loads and seismic loads for the specified design life.

	Information Assessed	Source of Information	Assessment
Foundation	Vessel foundation will maintain the load of a full vessel.	Specifications listed under Material Requisition above under References; 24590-WTP-DB-ENG-01-001, Rev. 1A, Basis of Design.	The Engineering Specification for Pressure Vessel Design and Fabrication requires the use of ASME BPV Code, Section VIII, Division 1 for the design of the WESP supports. This code ensures an adequate design for the WESP supports. Chapter 14 of the Basis of Design document requires that the foundation for each plant item be adequate to support the loads from full vessels.
	If in an area subject to flooding, the vessel is anchored.	Specifications listed under Material Requisition under References.	Buoyant forces of an empty vessel in a flooded room are a mandatory standard design load case in the Specification for Pressure Vessel Design and Fabrication.
	Vessel system will withstand the effects of frost heave.	24590-WTP-DB-ENG-01-001, Rev. 1A, Basis of Design.	The Basis of Design document requires that all structural foundations for outdoor equipment to extend a distance below grade that exceeds the 30" depth of the frost line. The WESPs are located inside/interior of the building at Elev. 3'-0" level, and the building's lower level floor is at Elev. (-) 21'-0", therefore, the foundations are not subject to frost heave.

	Information Assessed	Source of Information	Assessment
Waste Characteristics	Characteristics of the waste to be stored or treated have been identified (ignitable, reactive, toxic, specific gravity, vapor pressure, flash point, storage temperature)	Specification for WESPs listed above under References; 24590-WTP-PSAR-ESH-01-002-03, Rev. 1, Preliminary Safety Analysis Report to Support Construction Authorization: LAW Facility Specific Information; WA7890008967, *Dangerous Waste Portion of the Hanford Facility Resource Conservation and Recovery Act Permit for the Treatment, Storage, and Disposal of Dangerous Waste,* Chapter 10, and Attachment 51,~~"~~ Waste Treatment and Immobilization Plant."	The Specification for WESPs presents the offgas temperatures, pressures, and chemical composition to select appropriate materials and specify the corrosion allowance. Other waste characteristics that are hazardous, such as ignitability, reactivity, and toxicity are addressed by the Preliminary Safety Analysis Report for the LAW Vitrification Building and in Part A of the Permit, as an integral part of the design process. The WESPs provide primary confinement of the waste during normal operations, abnormal operations and during and after a Design Basis Earthquake. These plant items are grounded to control ignition sources.
	Vessel is designed to store or treat the wastes with the characteristics defined above and any treatment reagents.	24590-LAW-3YD-LOP-00001, Rev. 0, System Description for LOP and LVP: LAW Melter Offgas.	The System Description discusses normal and abnormal operations for the WESPs. Water will be used for flushing/rinsing or wash downs.
	The waste types are compatible with each other.	24590-LAW-3YD-LOP-00001, Rev. 0, System Description for LOP and LVP: LAW Melter Offgas.	The System Description for the LAW (LOP) does not describe any operations where incompatible wastes are mixed in the WESPs for processing. They function primarily to process byproduct offgas from the LAW melters concentrated feed waste received from the Pretreatment facility (PTF).

	Information Assessed	Source of Information	Assessment
Corrosion Protection	Vessel material and protective coatings ensure the vessel structure is adequately protected from the corrosive effects of the waste stream and external environments (expected to not leak or fail for the design life of the system)	Drawings and Specifications listed above under References; 24590-LAW-N1D-LOP-P0003, Rev. 0 Plant Item Material Selection Data Sheet, Melter 1 and Melter 2 Wet Electrostatic Precipitator (WESP), LOP-WESP-00001/2 (LAW); 24590-LAW-3YD-LOP-00001, Rev. 0, System Description for LOP and LVP: LAW Melter Offgas.	The Engineering Specification for WESPs and Plant Item Material Selection Data Sheet show that the WESPs, LOP-WESP-00001/2 normally operate at a pH range of 0.71 to 1.57 and at a temperature of 121°F (+/- 15°F). They are designed for a range of + 1 atmospheric to (-1) atmospheric pressure and for 170°F temperature. The material selected is 6% Mo alloy and a corrosion allowance of 0.04 in. The WESPs are located in the LAW cells (L-0123/L-0124) at Elevation 3'-0". The WESPs' support skirt material is 304 or 316. Each cell is equipped with a sump to pump out any leaks. Therefore, the cell should remain dry during normal operations which will limit external corrosion of the vessel over the facility design life.
Corrosion Allowance	Corrosion allowance is adequate for the intended service life of the vessel.	Specification for WESPs listed above under References; 24590-LAW-N1D-LOP-P0003, Rev. 0 Plant Item Material Selection Data Sheet, Melter 1 and Melter 2 Wet Electrostatic Precipitator (WESP), LOP-WESP-00001/2 (LAW).	The material selection and corrosion allowance are furnished in the Plant Item Material Selection Data Sheet and Specification for WESPs. Selection of 6% Mo alloy with a corrosion allowance of 0.04 in. for a service life of 40 years, appear to be adequate and appropriate.
Pressure Relief	Pressure controls (vents and relief valves) are adequately designed to ensure pressure relief if normal operating pressures in the vessel are exceeded.	Drawings listed above under References; 24590-LAW-3YD-LOP-00001, Rev. 0, System Description for LOP and LVP: LAW Melter Offgas.	The LOP Wet Electrostatic Precipitators , LOP-WESP-00001/2 are inline vessels designed for unrestricted upward continuous flow of offgas to the HEPA pre-heaters for further processing and for the unrestricted condensate gravity flow down into the C3/C5 drain/sump collection vessel (RLD-VSL-00004), as shown on the drawings and described in the System Description document.

Bechtel National, Inc.

Job No. 24590

SUPPLIER DOCUMENT STATUS

1. [x] **Work may proceed.**
2. [ ] **Revise and resubmit. Work may proceed subject to resolution of indicated comments.**
3. [ ] **Revise and resubmit. Work may not proceed.**
4. [ ] **Review not required. Work may proceed.**

Permission to proceed does not constitute acceptance or approval of design details, calculations, analyses, test methods, or materials developed or selected by the supplier and does not relieve supplier from full compliance with contractual obligations.

REVIEWED										

G-321 Document Category N/A
[From Supplement A to G-321-E (E) or G-321-V (V), as applicable, or "N/A" if SSRS is used]

Supersedes BNI Document No. N/A Rev.
[When applicable]

Accepted by DC Pflueger (Print Name) [signature] (Signature) 3/23/01 (Date)

Released by (Print Name) (Signature) (Date)
[When applicable]

416 GP&S 7-03

24590-CM-HC4-HXYG-00138-02-00018
REV. 00A

PURCHASE ORDER SUBMITTAL

Best Available Copy

R10273210

IQRPE REVIEW
OF
THE LOW ACTIVITY WASTE (LAW) FACILITY ELEVATION 28'-0" LEVEL-SECONDARY CONTAINMENT

"I, Tarlok S. Hundal have reviewed, and certified a portion of the design of a new tank system or component located at the Hanford Waste Treatment Plant, owned/operated by Department of Energy, Office of River Protection, Richland, Washington. My duties were independent review of the current design for the Low Activity Waste (LAW) Facility Elevation 28'-0" Level Secondary Containment, as required by The Dangerous Waste Regulations, namely, WAC 173-303-640(3) applicable paragraphs, i.e., (a) through (g)."

"I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment."

The documentation reviewed indicates that the design intent fully satisfies the requirements of the WAC.

The attached review is nine (9) pages numbered 1 through 9.

EXPIRES: 02/15/06

Signature

3/19/04
Date

24590-CM-HC4-HXYG-00138-02-00018, Rev. 00A

STRUCTURAL INTEGRITY ASSESSMENT OF LOW ACTIVITY WASTE (LAW) FACILITY ELEVATION 28'-0" LEVEL-SECONDARY CONTAINMENT

COGEMA-IA-42

REV. 0

Scope	Scope of this Integrity Assessment	This Integrity Assessment addresses Low Activity Waste (LAW) Facility Secondary Containment at Elev. 28'-0". The specific room considered in this assessment is L-0218.
References	Drawings	24590-LAW-P1-P01T-P0004, Rev. 0, LAW Vitrification Building General Arrangement Plan at El. 28'-0"; 24590-LAW-P1-P01T-P0009, Rev. 5, LAW Vitrification Building General Arrangement Section G-G, H-H, and J-J.
Summary of Assessment		For each item of "Information Assessed" (i.e., Criteria) on the following pages, the items listed under "Source of Information" were reviewed and found to furnish adequate design controls and requirements to ensure the design intent fully satisfies the requirements of Washington Administrative Code, WAC-173-303-640, *Dangerous Waste Regulations* for Tank Systems.

	Information Assessed	Source of Information	Discussion
Design	Description of subsurface conditions and soil bearing capacity are adequate.	24590-WTP-DC-ST-01-001, Rev. 1, Structural Design Criteria; 24590-BOF-3PS-CE01-T0001, Rev. 4, Engineering Specification for Excavation and Backfill; 24590-BOF-3PS-C000-T0001, Rev. 2, Engineering Specification for Material Testing Services; WTSC99-1036-42-17, RPP-WTP Final Report Geotechnical Investigation, Shannon & Wilson Inc. (H-1616-51), May 2000.	The Structural Design Criteria provides adequate design guidance for both mat and spread footings based on the Geotechnical Investigation report for the facility. Bearing capacity and settlement design parameters are presented for the dense Hanford Upper and Lower Sand Units and Structural Fill. Use of the loose wind blown (dune) sands for foundations is precluded. The Specification for Excavation and Backfill provides structural backfill requirements based on the geotechnical report and current codes and standards for the selection, placing, compacting, and backfill testing of candidate fill materials and completed backfills. The Specification for Material Testing Services provides current adequate codes and standards for testing of the candidate structural fill materials, and in-situ testing of structural fills as they are placed. The codes and standards are consistent with those called out in the Specification for Excavation and Backfill. The room identified in the scope is at Elev. 28'-0" level inside the building; the subsurface and soil related items do not directly associate with it but do have an overall effect on its structural strength from the foundation below.
	Foundation design loads (including full tanks) and estimated settlement are adequately considered.	24590-WTP-DC-ST-01-001, Rev. 1, Structural Design Criteria; ACI 318-99, Building Code Requirements for Structural Concrete and Commentary; ACI 349-01, Code Requirements for Nuclear Safety-Related Concrete Structures and Commentary; ASCE 7-98, Minimum Design Loads for Buildings and Other Structures.	The Structural Design Criteria uses current adequate standards to define design loads and load combinations (ASCE 7-98, ACI 349-01 and ACI 318-99). Dead and fluid loads are included in these loads and load combinations. Settlement design parameters are included in the Structural Design Criteria (Section 7.7, Geotechnical Design Parameters and Foundation Design). The room identified in the scope is at Elev. 28'-0" level inside the building; the subsurface and soil related items do not directly associate with it but do have an overall effect on its structural strength from the foundation below.

	Information Assessed	Source of Information	Discussion
Design	Design calculation approach and design basis of footings with design standard references (e.g., ACI) are adequate.	24590-WTP-DB-ENG-01-001, Rev. 1A, Basis of Design; 24590-WTP-DC-ST-01-001, Rev. 1, Structural Design Criteria; ACI 318-99, Building Code Requirements for Structural Concrete and Commentary.	The Basis of Design provides many fundamental general requirements for footing design. The Structural Design Criteria document references current adequate detailed design criteria for the design of concrete foundations and footings. ACI 318-99 is referenced for the strength design of commercial grade structures.
Foundation Design	Foundation material is compatible with the soil.	24590-WTP-3PS-DB01-T0001, Rev. 6, Engineering Specification for Furnishing and Delivering Ready-Mix Concrete; 24590-BOF-3PS-C000-T0001, Rev. 2, Engineering Specification for Material Testing Services; 24590-WTP-DB-ENG-01-001, Rev. 1A, Basis of Design.	The specification for Furnishing and Delivering Ready-Mix Concrete provides adequate current requirements for the selection of coarse and fine aggregates, and the procurement of cementitious materials. The specification for Material Testing Services provides adequate test procedures for testing the candidate aggregates to ensure adequate concrete durability. The Basis of Design document indicates the water table lies about 200 feet below the deepest foundations; therefore, there is little reason to expect compatibility problems between the concrete foundations and the site soils. The room identified in the scope is at Elev. 28'-0" level inside the building; the subsurface and soil related items do not directly associate with it but do have an overall effect on its structural strength from the foundation below.
	Foundation will withstand the effects of frost heave	24590-WTP-DC-ST-01-001, Rev. 1, Structural Design Criteria.	The Structural Design Criteria requires all structural foundations for outdoor components to extend below the 30" frost line from the finished grade (Elev. 0'-0"). Room L-0218 is inside/interior of the building at Elevation 28'-0", therefore, it is not subjected to the detrimental effects of frost heave.

	Information Assessed	Source of Information	Discussion
Seismic	Seismic considerations have been adequatcly addressed.	24590-WTP-PER-CSA-02-001, Rev. 4, Secondary Containment Design; 24590-WTP-DC-ST-01-001, Rev. 1, Structural Design Criteria; 23590-WTP-PSAR-ESH-010002-03, Rev. 1, Preliminary Safety Analysis Report to Support Construction Authorization: LAW Facility Specific Information; ACI 318-99, Building Code Requirements for Structural Concrete and Commentary; UBC 1997, Uniform Building Code; AISC M016-89, Manual of Steel Construction - Allowable Stress Design, Ninth Edition.	The Secondary Containment Design document describes and provides references for the design methodology, materials, loads, and load combinations (including seismic loads) for the LAW facility secondary containment components. The LAW Facility PSAR document shows the room in this integrity assessment to be Quality Level-2 (QL-2) and Seismic Category-III (SC-III) components. The Structural Design Criteria document provides detailed discipline specific codes and standards for the design of SC-III LAW secondary containment foundations, structures, and liners by the design engineers. Design loads and analysis methods for SC-III secondary containments and liners are taken from the Uniform Building Code. The ACI 318-99 code provides the design requirements and load combinations for the design of the secondary containment reinforced concrete foundations and structures. The AISC M016-89 code is used for the design of SC-III secondary containment stainless steel liners and building structural steel.

	Information Assessed	Source of Information	Discussion
Compatibility	The stored waste is compatible with its Secondary Containment and leak detection hardware based on a detailed chemical and physical analysis of the wastes used and other information sources.	24590-WTP-DB-ENG-01-001, Rev. 1A, Basis of Design; 24590-WTP-PER-M-02-001, Rev. 3, Material Selections for Building Secondary Containment/Leak Detection; 24590-WTP-PER-CSA-02-001, Rev. 4, Secondary Containment Design; 24590-WTP-PER-J-02-001, Rev. 4, Leak Detection – Sump Level Measurement in Secondary Containment Systems.	The Basis of Design document states that the secondary containment rooms are to be appropriately lined and any leaks or spills will be removed within 24 hours of a leak detection or in as timely a manner as possible. Based on a detailed chemical and physical analysis of the wastes and other process information sources, the Material Selections document identifies appropriate corrosion resistant materials for Secondary Containment liners, special protective coatings, and leak detection hardware. The Secondary Containment Design document provides adequate typical construction details for liners including tank anchorage details, special protective coatings, sumps, and leak detection equipment to be used for Secondary Containment where required. The Material Selections document states that special protective coatings are acceptable where human access is allowed for performing maintenance. Where sumps are used, the typical details are furnished for leak detection/sump level measurement systems equipment in the Leak Detection - Sump Level Measurement document.

	Information Assessed	Source of Information	Discussion
Strength	The design shows that the Secondary Containment has sufficient strength and thickness to prevent failure owing to pressure gradients, static head during a release, physical contact with the waste, climatic conditions, and the stress of daily operations (e.g., vehicular traffic).	Drawings listed above under References; 24590-WTP-DB-ENG-01-001, Rev. 1A, Basis of Design; 24590-WTP-PER-CSA-02-001, Rev. 4, Secondary Containment Design.	The LAW general arrangement drawings show the location of the secondary containment room in the building. Pressure gradients, static head during a release, physical contact with the waste, climatic conditions, and the stresses of daily operations are adequately stated as design goals in the Basis of Design document. The Secondary Containment Design document describes and provides references for the design methodology, materials, loads, and load combinations (including seismic loads) for the LAW facility secondary containment components. The secondary containment being considered is located in the room inside the LAW Vitrification Building rather than being directly buried, therefore, pressure gradients and vehicular traffic are not considered applicable load cases.
	The Secondary Containment system has sufficient strength in the presence of operational stresses from site-specific conditions (i.e., traffic, heavy equipment, precipitation, frost).	Drawings listed above under References; 24590-WTP-PER-CSA-02-001, Rev. 4, Secondary Containment Design; 24590-WTP-3PS-NLLR-T0002, Rev. 0, Engineering Specification for Furnishing, Detailing, Fabrication, Delivery and Installation of Stainless Steel Liner Plates; 24590-WTP-PER-M-02-001, Rev. 3, Material Selections for Building Secondary Containment/Leak Detection.	The LAW facility drawings show Secondary Containment being considered is installed inside the building. Because it is located inside the building, traffic, heavy equipment, precipitation and frost are not applicable load cases. The Secondary Containment Design document identifies the applicable load cases (operational stresses) from site specific conditions that must be considered in the design. The Engineering Specification for Furnishing Stainless Steel Liner Plates includes specific provisions for protection of and repair of completed liners during the construction process. The Material Selections for Building Secondary Containment document addresses the potential effects of operations conditions on metal liner/special protective coating integrity and the associated maintenance requirements.

	Information Assessed	Source of Information	Discussion
Foundation Integrity	The Secondary Containment is properly supported by a foundation or base in order to prevent failure from settlement, compression, or uplift, including the residual effects of installation.	Drawings listed above under References; 24590-WTP-DC-ST-01-001, Rev. 1, Structural Design Criteria; 24590-WTP-PER-CSA-02-001, Rev. 4, Secondary Containment Design.	Settlement, compression, or uplift including the residual effects of installation, are addressed in the Secondary Containment Design document and the Structural Design Criteria. The design requirements and codes and standards specified are adequate to satisfy these performance goals. The design and construction specifications adequately provide for proper foundation construction and installation of the Secondary Containment. The LAW general arrangement drawings provide appropriate location of the Secondary Containment being considered.
	The placement, structural support, and type of material used for backfill around and below the Secondary Containment are appropriate.	Drawings listed above under References; 24590-WTP-DC-ST-01-001, Rev. 1, Structural Design Criteria; 24590-BOF-3PS-CE01-T0001, Rev. 5, Engineering Specification for Excavation and Backfill; 24590-BOF-3PS-C000-T0001, Rev. 2, Engineering Specification for Material Testing Services.	The LAW facility drawings show the Secondary Containment being considered is installed inside the building. Because it is located inside the building at Elev. 28'-0", the backfill material requirements are not applicable; however, the design requirements for structural support for the Secondary Containment are adequately addressed in the Structural Design Criteria document. The Excavation and Backfill, and Material Testing specifications contain current adequate industry standards for selecting and testing fill materials, placing and compacting backfills, and testing to ensure adequate compaction. Requirements for testing and record keeping are adequate for both safety grade fills and commercial grade fills are addressed in Specification for Material Testing and Specification for Excavation and Backfill.

	Information Assessed	Source of Information	Discussion
Infiltration	The design or operation (e.g., diking & curbing) prevents run-on or infiltration of precipitation into the Secondary Containment system unless the collection system has sufficient excess capacity (25 yr rainfall) to contain the run-on precipitation.	Drawings listed above under References; 24590-WTP-DB-ENG-01-001, Rev. 1A Basis of Design.	The Basis of Design document requires the design to provide adequate measures to prevent run-on or infiltration of precipitation. The secondary containment is located inside the LAW Vitrification Building where it is protected from direct precipitation by the building structure as shown in the general arrangement drawings
	The design includes an external moisture barrier or other means to prevent moisture from entering the room.	Drawings listed above under References; 24590-WTP-DB-ENG-01-001, Rev. 1A, Basis of Design.	The Basis of Design document requires the design include provisions to prevent external moisture intrusion. The Secondary Containment shown in the general arrangement drawings is inside the LAW Vitrification Building which shields it from precipitation and surface water percolation. As noted in the Basis of Design document, the ground water table is located about 200 feet below the building mat foundation, therefore, ground water infiltration is precluded.

	Information Assessed	Source of Information	Discussion
Liner System	The containment area is free of cracks or gaps and the design discusses methods of their minimization.	24590-WTP-DB-ENG-01-001, Rev. 1A, Basis of Design; 24590-WTP-PER-CSA-02-001, Rev. 4, Secondary Containment Design; 24590-WTP-PER-M-02-001, Rev. 3, Material Selections for Building Secondary Containment/Leak Detection; 24590-WTP-3PS-AFPS-TP006, Rev. 0, Field Applied Special Protective Coatings for Secondary Containment Areas.	The Basis of Design document requires the liner system to be free of cracks and gaps. The Secondary Containment Design document provides current adequate design requirements, and codes and standards to design leak tight liners. This document includes appropriate details for installation of stainless steel liners and special protective coatings free of cracks and gaps. The Material Selections and Special Protective Coatings documents provide adequate requirements for the secondary containment liners and protective coating materials, respectively.
	The design has considered the compatibility of the concrete liner or coatings and waste and presents information on coatings planning to be used from the manufacturer addressing compatibility with the stored waste. The lining or coating must prevent the waste from migrating into the concrete.	24590-WTP-PER-M-02-001, Rev. 3, Material Selections for Building Secondary Containment/Leak Detection; 24590-WTP-PER-CSA-02-001, Rev. 4, Secondary Containment Design; 24590-WTP-3PS-AFPS-TP006, Rev. 0, Field Applied Special Protective Coatings for Secondary Containment Areas.	The Material Selections and Special Protective Coating documents contain general information on the compatibility of planned Secondary Containment stainless steel liners and special protective coatings with the waste. These linings and special protective coatings prevent the waste from migrating into the concrete. The Secondary Containment Design and Special Protective Coatings documents provide standard installation details for liners and special protective coatings that will ensure leak-tight liners that prevent the migration of the waste into the concrete.

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Job No. 24590

SUPPLIER DOCUMENT STATUS

1. [X] **Work may proceed.**
2. [ ] **Revise and resubmit. Work may proceed subject to resolution of indicated comments.**
3. [ ] **Revise and resubmit. Work may not proceed.**
4. [ ] **Review not required. Work may proceed.**

Permission to proceed does not constitute acceptance or approval of design details, calculations, analyses, test methods, or materials developed or selected by the supplier and does not relieve supplier from full compliance with contractual obligations.

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G-321 Document Category N/A
[From Supplement A to G-321-E (E) or G-321-V (V), as applicable, or "N/A" if SSRS is used]

Supersedes BNI Document No. N/A Rev.
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Accepted by DCPfluger (Print Name) DCPfluger (Signature) 5/13/04 (Date)

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[When applicable]

416 GP&S 7-03

24590-CM-HC4-HXYG-00138-02-00029
REV. 00A

SUBCONTRACT SUBMITTAL

R10311553

IQRPE REVIEW
OF
LOW ACTIVITY WASTE (LAW) MELTER FEED PROCESS SYSTEM (LFP) ELEV. 3'-0" ANCILLARY EQUIPMENT

"I, Tarlok Hundal, have reviewed, and certified a portion of the design of a new tank system or component located at the Hanford Waste Treatment Plant, owned/operated by Department of Energy, Office of River Protection, Richland, Washington. My duties were independent review of the current design for the Low Activity Waste (LAW) Melter Feed Process System (LFP) Elev. 3'-0" Ancillary Equipment as required by the Dangerous Waste Regulations, namely, WAC 173-303-640(3) (applicable paragraphs (i.e., (a) through (g)."

"I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment."

The documentation reviewed indicates that the design intent fully satisfies the requirements of the WAC.

The attached review is eight pages numbered 1 through 8.

TARLOK SINGH HUNDAL
STATE OF WASHINGTON
20213
REGISTERED PROFESSIONAL ENGINEER
EXPIRES: 02/15/06

T S Hundal
Signature

5/11/04
Date

24590-CM-HC4-HXYG-00138-02-00029, REV. 00A

Best Available Copy

STRUCTURAL INTEGRITY ASSESSMENT OF THE LOW ACTIVITY WASTE (LAW) MELTER FEED PROCESS SYSTEM (LFP) ELEV. 3'-0" ANCILLARY EQUIPMENT

COGEMA-IA-055

REV. 0

Please note that source, special nuclear and byproduct materials, as defined in the Atomic Energy Act of 1954 (AEA), are regulated at the U.S. Department of Energy (DOE) facilities exclusively by DOE acting pursuant to its AEA authority. DOE asserts, that pursuant to the AEA, it has sole and exclusive responsibility and authority to regulate source, special nuclear, and byproduct materials at DOE-owned nuclear facilities. Information contained herein on radionuclides is provided for process description purposes only.

Scope	Scope of this Integrity Assessment	This Integrity Assessment addresses the Ancillary Equipment (piping, pipe supports, and their appurtenances) of the LAW Melter Feed Process system in the LAW facility. They include the following vessels and components: 1. Ancillary Equipment associated with four vessels: Two vessels (LFP-VSL-00002/3) located in cell L-0123 and two vessels (LFP-VSL-00003/4) located in cell L-0124 at (Elev. 3'- 0") of the LAW facility. The ancillary equipment associated with these four vessels is shown on P&ID drawings 24590-LAW-M6-LFP-P0001 and P0003. <u>Note</u>: Additional plant items or components (vessels, tanks, pumps, plant vent headers, floor drains, bulges, collection header overflows), served by the ancillary equipment associated with the above listed vessels are also shown on the drawings listed in the References below. These plant items and components are located in various rooms/cells of the LAW facility. Ancillary equipment located inside the LFP system vessels and plant items is addressed separately in the Integrity Assessments for these vessels and plant items.
References	Drawings and System Description	Drawings: 24590-LAW-P1-P01T-P0002, Rev. 3, LAW Vitrification Building General Arrangement Plan at El. 3'-0"; 24590-LAW-P1-P01T-P0010, Rev. 5, LAW Vitrification Building General Arrangement Section K-K and L-L; 24590-LAW-M6-LFP-P0001, Rev. 1, P&ID – LAW Melter Feed Process System Melter 1 Feed Preparation and Feed; 24590-LAW-M6-LFP-P0003, Rev. 1, P&ID – LAW Melter Feed Process System Melter 2 Feed Preparation and Feed. System Description: 24590-LAW-3YD-LFP-00001, Rev. 0, System Description for LAW Melter Feed Process System (LFP), (Including SDCN No. 24590-LAW-3YN-LFP-00001).
Summary of Assessment		For each item of "Information Assessed" (i.e., Criteria) on the following pages, the items listed under "Source of Information" were reviewed and found to furnish adequate design controls and requirements to ensure the design intent fully satisfies the requirements of Washington Administrative Code, WAC-173-303-640, *Dangerous Waste Regulations* for Tank Systems.

	Information Assessed	Source of Information	Discussion
Design	Ancillary equipment design standards are appropriate and adequate for the equipment's intended use.	Drawings listed above under References; 24590-WTP-DC-PS-01-001, Rev. 2, Pipe Stress Design Criteria Including "Pipe Stress Criteria" and "Span Method Criteria"; ASME B31.3 Code, Process Piping, 1996 Edition, American Society of Mechanical Engineers; 24590-WTP-PSAR-ESH-01-002-03, Rev. 1, Preliminary Safety Analysis Report (PSAR) to Support Construction Authorization: LAW Facility Specific Information.	The Pipe Stress Design Criteria specifies ASME B31.3 as the design code for piping systems of the WTP. The P&ID drawings show the ancillary equipment piping and components as Seismic Category III and Commercial Grade Quality Level. The Pipe Stress Design Criteria document provides a detailed discussion of seismic categories. Quality Levels are discussed in the PSAR. These codes and standards are acceptable and adequate for the design of the ancillary equipment piping and components for their intended service.
	If the ancillary equipment to be used is not built to a design standard, the design calculations demonstrate sound engineering principles of construction.	ASME B31.3 Code, Process Piping, 1996 Edition, American Society of Mechanical Engineers; 24590-WTP-DC-PS-01-001, Rev. 2, Pipe Stress Design Criteria Including "Pipe Stress Criteria" and "Span Method Criteria."	The ancillary equipment is to be built to the design standards. The Pipe Stress Design Criteria specifies that piping is to be designed in accordance with ASME B31.3, Code.

	Information Assessed	Source of Information	Discussion
Design	Ancillary equipment has adequate strength at the end of its design life to withstand the operating pressure, operating temperature, thermal expansion, and seismic loads. Equipment is protected against physical damage and excessive stress due to settlement, vibration, expansion, or contraction.	24590-WTP-DB-ENG-01-001, Rev 1A, Basis of Design; 24590-WTP-DC-PS-01-001, Rev. 2, Pipe Stress Design Criteria Including "Pipe Stress Criteria" and "Span Method Criteria"; 24590-WTP-PER-M-02-002, Rev. 1, Materials for Ancillary Equipment; ASME B31.3 Code, Process Piping, 1996 Edition, American Society of Mechanical Engineers; DOE-STD-1020-94, Natural Phenomenon Hazards Design Evaluation Criteria for Department of Energy Facilities (including Change Notice #1, January 1996); UBC, Uniform Building Code, 1997 Edition.	The Basis of Design document specifies that mechanical equipment is to be designed for a nominal plant life of 40 years. The Materials for Ancillary Equipment document specifies that ancillary equipment downstream of a waste source vessel or miscellaneous plant items is to be constructed of the same or better material and with the same corrosion allowance as the source vessel or plant items, unless the service seen in the downstream line warrants a different material, corrosion allowance, or other modification. The Pipe Stress Design Criteria requires the use of the ASME B31.3 Code and DOE-STD-1020-94 Standard, for piping design. ASME B31.3 requires explicit consideration of operating pressure, operating temperature, thermal expansion and contraction, settlement, vibration, and corrosion allowance in the design of piping. ASME BPV Code, Section III, Code Case N-411, Subsection NC, Appendix N, and Appendix F, and the Uniform Building Code (UBC) are used to supplement the requirements of ASME B31.3 and DOE-STD-1020-94 for design as applicable to the appropriate Seismic Category of the ancillary equipment. Details of the seismic design methods are discussed in the Pipe Stress Design Criteria document. These are appropriate and adequate codes and standards to ensure that the ancillary equipment has adequate strength at the end of its design life to withstand all anticipated loads.

	Information Assessed	Source of Information	Discussion
Supports	Ancillary equipment supports are adequately designed.	Specifications listed above under References; 24590-WTP-DC-PS-01-002, Rev. 2, Pipe Support Design Criteria; ASME B31.3 Code, Process Piping, 1996 Edition, American Society of Mechanical Engineers; ASME Boiler and Pressure Vessel Code, Section III, Division 1, Rules for Construction of Nuclear Power Plant Components, 1995; ASME B&PV Code, Section VIII, Division 1, Rules for Construction of Pressure Vessels; 24590-WTP-PER-PS-02-001, Rev. 4, Ancillary Equipment Pipe Support Design; 24590-WTP-PL-PS-01-001, Rev. 1, Verification and Validation Test Plan for Bechtel's ME150 Pipe Support Family of Programs (PCFAPPS).	The Pipe Support Design Criteria document considers all loadings and loading combinations identified in ASME B31.3 and utilizes ASME BPV Code, Section III, Division 1, Subsection NF and Appendix F, to supplement the requirements of ASME B31.3 for seismic design of the applicable Seismic Category of the pipe supports. Bounding load cases are passed to the pipe support designers from the results of the ancillary equipment piping stress analyses. Details of the seismic design methodology are discussed in the Pipe Support Design Criteria document. Examples of typical ancillary equipment supports are shown in the Ancillary Equipment Pipe Support Design document. Analysis is by manual calculation or approved computer programs that have been verified and validated. These are appropriate codes and standards for design of ancillary equipment supports for the LFP system. Ancillary equipment supports are to be designed in such a way that the heat transferred from supports to the building structure does not raise the building structure temperature to exceed 150°F for concrete and 200°F for steel.
Foundations	The system will withstand the effects of frost heave.	Drawings and System Description listed above under References; 24590-WTP-DC-ST-01-001, Rev. 2, Structural Design Criteria.	The LFP system ancillary equipment considered in this assessment is located inside the LAW. The Structural Design Criteria requires that all structural foundations shall extend into the surrounding soil below the 30" frost line, to preclude frost heave. The LAW facility structural foundation under this area of the ancillary equipment is at the lower level Elev. (-) 21'-0" of the building, therefore, the ancillary equipment is not subject to the effects of frost heave.

	Information Assessed	Source of Information	Discussion
Connections	Seams and connections are adequately designed.	24590-WTP-DB-ENG-01-001, Rev 1A, Basis of Design; ASME B31.3 Code, Process Piping, 1996 Edition, American Society of Mechanical Engineers; 24590-WTP-DC-PS-01-001, Rev. 2, Pipe Stress Design Criteria Including "Pipe Stress Criteria" and "Span Method Criteria"; ASME BPV Code, Section IX, Welding and Brazing Qualifications; ASME B16.5, Piping Flanges and Flanged Fittings.	The Basis of Design specifies that in-cell piping that is non-maintainable will be fully welded. The Pipe Stress Design Criteria specifies the ASME B31.3 Process Piping design code for the piping systems. Welding is to be performed in accordance with the requirements of ASME B31.3 and the ASME BPV Code, Section IX. ASME B16.5 Code is specified for flange designs. These are appropriate codes and standards for the design and fabrication of the LFP System ancillary equipment.
Waste Characteristics	Characteristics of the waste to be stored or treated have been identified (ignitable, reactive, toxic, specific gravity, vapor pressure, flash point, temperature)	System Description listed above under References; 24590-WTP-PSAR-ESH-01-002-03, Rev. 1, Preliminary Safety Analysis Report to Support Construction Authorization: LAW Facility Specific Information; Department of Ecology Permit # WA7890008967, *Dangerous Waste Portion of the Hanford Facility Resource Conservation and Recovery Act Permit for the Treatment, Storage, and Disposal of Dangerous Waste,* Chapter 10, and Attachment 51, "Hanford Tank Waste Treatment and Immobilization Plant."	The ancillary equipment associated with the LFP system serves to transfers waste between numerous plant vessels, tanks, and other plant items in the LAW. The ancillary equipment considered in this assessment will handle wastes with the same characteristics as do the source vessels. The waste characteristics of source vessels have been appropriately assessed in separate integrity assessments for the associated vessels. The Preliminary Safety Analysis Report (PSAR) and Part A of the Permit, provide a summary of potential hazardous conditions associated with each LAW Facility vessel and the design provisions that are to be used to provide adequate control of each hazard.

	Information Assessed	Source of Information	Discussion
Waste Characteristics	Ancillary equipment is designed to handle the wastes with the characteristics defined above and any treatment reagents.	System Description listed above under References; 24590-WTP-PER-M-02-002, Rev. 1, Materials for Ancillary Equipment.	The Materials for Ancillary Equipment document specifies that ancillary equipment materials that contact the waste are to be equal to or better than those of the upstream source vessels, unless the service seen in the downstream line warrants a different material, corrosion allowance, or other modification. The System Description states that compatible reagents are added to the LFP vessels during normal or non-routine operations.
Compatibility	The pH range of the waste, waste temperature and the corrosion behavior of the structural materials are adequately addressed. Ancillary equipment material and protective coatings ensure the ancillary equipment structure is adequately protected from the corrosive effects of the waste stream and external environments. The protection is sufficient to ensure the equipment will not leak or fail for the design life of the system.	24590-WTP-DB-ENG-01-001, Rev. 1A, Basis of Design; 24590-WTP-PER-M-02-002, Rev. 1, Materials for Ancillary Equipment; 24590-WTP-3PS-NN00-T0001, Rev. 0, Engineering Specification for Hot and Anti-Sweat Thermal Insulation.	The Basis of Design document identifies a service design life of 40 years for the ancillary equipment. Detailed materials selection (corrosion) evaluations are conducted for each vessel in the LAW facility during process design to ensure a 40 year service life. The Materials for Ancillary Equipment document requires that the material selection and corrosion/erosion allowances for ancillary equipment in contact with the waste will be equal to or better than the material and corrosion allowance of the waste source vessel, unless the service seen in the downstream line warrants a different material, corrosion allowance, or other modification. The Thermal Insulation specification requires that all insulating materials used on the outside of ancillary equipment be pre-approved for use on austenitic stainless steel in accordance with applicable ASTM procedures and tests to preclude external corrosion of ancillary equipment. Therefore, the ancillary equipment will provide the expected design service life.

	Information Assessed	Source of Information	Discussion
Corrosion Allowance	Corrosion allowance is adequate for the intended service life of the ancillary equipment.	ASME B31.3 Code, Process Piping, 1996 Edition, American Society of Mechanical Engineers; 24590-WTP-PER-M-02-002, Rev. 1, Materials for Ancillary Equipment; 24590-WTP-DC-PS-01-001, Rev. 2, Pipe Stress Design Criteria Including "Pipe Stress Criteria" and "Span Method Criteria"; 24590-WTP-PER-PL-02-001, Rev. 5, Piping Material Class Description.	The Pipe Stress Design Criteria specifies ASME B31.3 as the design code for the WTP piping. Consideration of corrosion, including corrosion allowance, is a mandatory requirement of ASME B31.3. A required service life of 40 years is identified in the Basis of Design document for ancillary equipment. Detailed materials selection (corrosion) evaluations are conducted for each vessel in the LAW facility during process design to ensure a 40 year service life. The Materials for Ancillary Equipment document requires that the downstream ancillary equipment is to be constructed of equal or better materials, and with the same corrosion allowance as the source vessel, unless the service seen in the downstream line warrants a different material, corrosion allowance, or other modification. Corrosion/Erosion allowances are listed for each Piping Material Class in the Piping Material Class Description document. These requirements are adequate to assure the ancillary equipment provides the intended service life.
Strength	Pressure controls (vents and relief valves) are adequately designed to ensure pressure relief if normal operating pressures in the vessels are exceeded.	Drawings listed above under References; ASME B31.3 Code, Process Piping, 1996 Edition, American Society of Mechanical Engineers; 24590-WTP-DC-PS-01-001, Rev. 2, Pipe Stress Design Criteria Including "Pipe Stress Criteria" and "Span Method Criteria"; 24590-WTP-PER-PL-02-001, Rev. 5, Piping Material Class Description.	The Pipe Stress Design Criteria document specifies ASME B31.3 as the design code for the WTP piping. ASME B31.3 requires provisions be made to safely contain or relieve any pressure to which the piping may be subjected. ASME B31.3 piping not protected by a pressure relieving device, or that can be isolated from a pressure reliving device must be designed for at least the highest pressure that can be developed. The Piping Material Class Description document provides bounding pressure and temperature limits for each of the piping material classes shown on the P&ID drawings. Pressure relief provisions are adequate for the intended service.

	Information Assessed	Source of Information	Discussion
	Maximum flows and any unusual operating stresses are identified	Drawings and Specifications listed above under References; ASME B31.3 Code, Process Piping, 1996 Edition, American Society of Mechanical Engineers; 24590-WTP-DC-PS-01-001, Rev. 2, Pipe Stress Design Criteria Including "Pipe Stress Criteria" and "Span Method Criteria"; 24590-WTP-PER-PL-02-001, Rev. 5, Piping Material Class Description.	The expected flow paths for the ancillary equipment are identified on the P&ID drawings. The Pipe Stress Design Criteria specifies ASME B31.3 Code for piping design. This code requires piping to be designed to the highest pressure that can be developed in a piping system ensuring that maximum operating stresses remain within code allowables. Piping material classes are shown on the P&IDs embedded in the item numbers for each ancillary equipment component. The Piping Material Class Description document lists the bounding pressure and temperature limits for each piping material class.
Secondary Containment	Ancillary equipment is designed with secondary containment that is constructed of materials compatible with the waste and of sufficient strength to prevent failure (pressure gradients, waste, climatic conditions, daily operations), provided with a leak-detection system, and designed to drain and remove liquids.	Drawings and System Description listed above under References; 24590-WTP-PER-CSA-02-001, Rev. 4, Secondary Containment Design; 24590-WTP-DB-ENG-01-001, Rev. 1A, Basis of Design.	The Basis of Design document states that ancillary equipment shall be provided with a secondary containment. The ancillary equipment considered in this assessment is located in R5/C5 (process cell) areas within the LAW. These LAW room/cell areas are secondary containment concrete structures including sumps as shown on the general arrangement drawings. The cells and sumps are lined with stainless steel plates as detailed in the Secondary Containment Design document. The secondary containment structures are outside the scope of this integrity assessment and their assessment is conducted in a separate document. Each cell sump is equipped with a leak detection device and a liquid removal device such as steam ejector or electrical pump.

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Job No 24590

SUPPLIER DOCUMENT STATUS

1. [X] **Work may proceed.**
2. [ ] **Revise and resubmit. Work may proceed subject to resolution of indicated comments.**
3. [ ] **Revise and resubmit. Work may not proceed.**
4. [ ] **Review not required. Work may proceed.**

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Released by N/A (Print Name) (Signature) (Date)
[When applicable]

416 GP&S 7-03

24590-CM-HC4-HXYG-00138-02-00032
REV. 00A

SUBCONTRACT SUBMITTAL

R10313648

COGEMA-IA-056, Rev. 0

IQRPE REVIEW –
LOW ACTIVITY WASTE (LAW) VITRIFICATION FACILITY ELEVATION 3'-0" PRIMARY OFFGAS SYSTEM (LOP) ANCILLARY EQUIPMENT

"I, Douglas W. Hendrickson, have reviewed, and certified a portion of the design of a new tank system or component located at the Hanford Waste Treatment Plant, owned/operated by Department of Energy, Office of River Protection, Richland, Washington. My duties were independent review of the current design for the Low Activity Waste (LAW) Vitrification Facility Elevation 3'-0" Primary Offgas System (LOP) Ancillary Equipment as required by the Dangerous Waste Regulations, namely, WAC 173-303-640(3) applicable paragraphs, i.e., (a) through (g)."

"I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment."

The documentation reviewed indicate that the design intent fully satisfies the requirements of the WAC.

The attached review is ten (10) pages numbered one (1) through ten (10).

DOUGLAS W. HENDRICKSON
STATE OF WASHINGTON
33907
REGISTERED PROFESSIONAL ENGINEER
5/18/04
EXPIRES 10 June 2005

Signature P.E.

18 May 2004
Date

24590-CM-HC4-HXYG-00138-02-00032, Rev. 00A

STRUCTURAL INTEGRITY ASSESSMENT OF THE LOW ACTIVITY WASTE (LAW) VITRIFICATION FACILITY ELEVATION 3'-0" PRIMARY OFFGAS SYSTEM (LOP) ANCILLARY EQUIPMENT

COGEMA-IA-056
REV. 0

Please note that source, special nuclear and byproduct materials, as defined in the Atomic Energy Act of 1954 (AEA), are regulated at the U.S. Department of Energy (DOE) facilities exclusively by DOE acting pursuant to its AEA authority. DOE asserts, that pursuant to the AEA, it has sole and exclusive responsibility and authority to regulate source, special nuclear, and byproduct materials at DOE-owned nuclear facilities. Information contained herein on radionuclides is provided for process description purposes only.

Scope	Scope of this Integrity Assessment	This integrity assessment includes: a. Ancillary equipment associated with the LAW Melter 1 Submerged Bed Scrubber (SBS), SBS Condensate Vessel, and Wet Electrostatic Precipitator (WESP), as shown on drawing 24590-LAW-M6-LOP-P0001, Rev. 1, not including the spools and bellows between the film coolers and the SBS. b. Ancillary equipment associated with the LAW Melter 2 Submerged Bed Scrubber (SBS), SBS Condensate Vessel, and Wet Electrostatic Precipitator (WESP), as shown on drawing 24590-LAW-M6-LOP-P0002, Rev. 1, not including the spools and bellows between the film coolers and the SBS.
References	Drawings, System Description, and PSAR	24590-LAW-3YD-LOP-00001, Rev. 0, System Description for LOP and LVP: LAW Melter Offgas; 24590-LAW-M5-V17T-P0007, Rev. 0, Process Flow Diagram LAW Melter 1 Primary Offgas Treatment System (System LOP); 24590-LAW-M5-V17T-P0008, Rev. 0, Process Flow Diagram LAW Melter 2 Primary Offgas Treatment System (System LOP); 24590-LAW-M6-LOP-P0001, Rev. 1, P & ID-LAW Primary Offgas Process System Melter 1; 24590-LAW-M6-LOP-P0002, Rev. 1, P & ID-LAW Primary Offgas Process System Melter 2; 24590-LAW-P1-P01T-P0002, Rev. 3, LAW Vitrification Building General Arrangement Plan at El. 3'-0"; 24590-LAW-P1-P01T-P0007, Rev. 5, LAW Vitrification Building General Arrangement Section A-A, B-B, and C-C; 24590-WTP-PSAR-ESH-01-002-03, Rev. 1, Preliminary Safety Analysis Report to Support Construction Authorization: LAW Facility Specific Information
References	Plant Item Material Selection Data Sheets, Mechanical Data Sheets	24590-LAW-N1D-LOP-P0001, Rev. 0, Plant Item Material Selection Data Sheet, LOP-SCB-00001& LOP-SCB-00002 (LAW) Melter 1 and Melter 2 Submerged Bed Scrubbers (SBS); 24590-LAW-MKD-LOP-P0008, Rev. 0, Mechanical Data Sheet: Vessel, Melter 1, 2 Submerged Bed Scrubber; 24590-LAW-N1D-LOP-P0002, Rev. 0, Plant Item Material Selection Data Sheet, LOP-VSL-00001 & LOP-VSL-00002 (LAW) Melter 1 & Melter 2 SBS Condensate Vessel; 24590-LAW-N1D-LOP-P0003, Rev. 0, Plant Item Material Selection Data Sheet, LOP-WESP-00001 and LOP-WESP-00002 (LAW) Melter 1 and Melter 2 Wet Electrostatic Precipitator (WESP); 24590-LAW-MXD-LOP-00001, Rev. B, Mechanical Data Sheet: Process Bulge, LOP-BULGE-00001; 24590-LAW-MXD-LOP-00002, Rev. B, Mechanical Data Sheet: Process Bulge, LOP-BULGE-00002

Summary of Assessment

For each item of "Information Assessed" (i.e., Criteria) on the following pages, the items listed under "Source of Information" were reviewed and found to furnish adequate design controls and requirements to assure the design intent fully satisfies the WAC requirements.

	Information Assessed	Source of Information	Assessment
Design	Ancillary equipment design standards are appropriate and adequate for the equipment's intended use.	Drawings and material selection and data sheets listed above under References; 24590-WTP-DC-PS-01-001, Rev 2, Pipe Stress Design Criteria including "Pipe Stress Criteria" and "Span Method Criteria"; ASME B31.3 Code, Process Piping, 1996 Edition, American Society of Mechanical Engineers; 24590-WTP-PSAR-ESH-01-002-03, Rev. 1, Preliminary Safety Analysis Report to Support Construction Authorization: LAW Facility Specific Information; 24590-WTP-MX00-TP001, Rev. 1, Process Bulge Design and Fabrication.	The Pipe Stress Design Criteria document identifies ASME B31.3 as the design code for piping systems of the WTP. The Ancillary equipment is predominantly Quality Level-2 (QL-2) and specified Important to Safety with seismic protection to ensure continued function during normal operations, abnormal operations, and during and after a SC-III Design Basis Seismic Event. The Seismic Categories are explained in detail in the Pipe Stress Design Criteria document. Quality Levels are discussed in the PSAR. Bulge design and fabrication for SC III equipment is required to be in accord with UBC Zone 2B requirements and the Manual of Steel Construction (Allowable Stress Design, 9th Ed.). These codes and standards are acceptable and adequate for the design of the ancillary equipment and secondary containment (bulges) for the intended service.
	If the ancillary equipment to be used is not built to a design standard, the design calculations demonstrate sound engineering principles of construction.	24590-WTP-DC-PS-01-001, Rev 2, Pipe Stress Design Criteria including "Pipe Stress Criteria" and "Span Method Criteria"; 24590-WTP-MX00-TP001, Rev. 1, Process Bulge Design and Fabrication; 24590-LAW-MXD-LOP-00001, Rev. B, Mechanical Data Sheet: Process Bulge, LOP-BULGE-00001; 24590-LAW-MXD-LOP-00002, Rev. B, Mechanical Data Sheet: Process Bulge, LOP-BULGE-00002	The ancillary equipment is built to design and fabrication standards. The Pipe Stress Design Criteria document specifies that piping is to be designed in accordance with ASME B31.3. Bulge mechanical data sheets indicate bulge construction is to QL-CM and SC-III of 0.25" 316L Stainless Steel with a washring and demineralized water supply for decontamination; although mechanical data sheets are not finalized, 24590-WTP-MX00-TP001and the data sheets demonstrate sound engineering principles in the design intent of the bulges.

Information Assessed		Source of Information	Assessment
Design	Ancillary equipment has adequate strength at the end of its design life to withstand the operating pressure, operating temperature, thermal expansion, and seismic loads. Equipment is protected against physical damage and excessive stress due to settlement, vibration, expansion, or contraction.	24590-WTP-DB-ENG-01-001, Rev 1A, Basis of Design; 24590-WTP-PER-M-02-002, Rev. 1, Materials for Ancillary Equipment; 24590-WTP-DC-PS-01-001, Rev 2, Pipe Stress Design Criteria including "Pipe Stress Criteria" and "Span Method Criteria"; Uniform Building Code (UBC), 1997 Edition, International Conference of Building Officials; ASME Boiler and Pressure Vessel Code, Section III, Rules for Construction of Nuclear Facility Components, Division 1, Subsection NC, Appendix N and Appendix F, 1995; 24590-WTP-VV-PS-01-001, Rev. 2, Verification and Validation Report for ME101, Linear Elastic Analysis of Piping, Version N8	The Basis of Design document specifies that mechanical equipment be designed for a nominal plant life or 40 years. The Materials for Ancillary Equipment document specifies that ancillary equipment down stream of a waste source vessel is to be constructed of the same or better material and with the same corrosion allowance as the source vessel. The Pipe Stress Design Criteria document requires the use of the ASME B31.3 Code for piping design. ASME B31.3 requires explicit consideration of many loadings including operating pressure, operating temperature, thermal expansion/contraction, settlement, vibration, and corrosion allowance in the design of piping. ASME B&PV Code, Section III, Division 1, Subsection NC and Appendix F, and the Uniform Building Code (UBC) are used to supplement the requirements of ASME B31.3 for seismic design of SC-III/SC-IV piping for this ancillary equipment. Details of the seismic design methods are discussed in the Pipe Stress Design Criteria document. Design is by hand calculations and computer codes that have been tested and approved as discussed in the Verification and Validation Report for ME101, Linear Elastic Analysis of Piping, Version N8. These are adequate and appropriate codes and standards to ensure that the ancillary equipment will have adequate strength at end of design life to withstand all anticipated loadings.

Information Assessed		Source of Information	Assessment
Supports	Ancillary equipment supports are adequately designed.	Drawings - see references above; 24590-WTP-DC-PS-01-002, Rev 2, Pipe Support Design Criteria; 24590-WTP-PER-PS-02-001, Rev. 4, Ancillary Equipment Pipe Support Design; ASME B31.3 Code, Process Piping, 1996 Edition, American Society of Mechanical Engineers; ASME Boiler and Pressure Vessel Code, Section III, Rules for Construction of Nuclear Facility Components, Division 1, Subsection NF and Appendix F, 1995; 24590-WTP-PL-PS-01-001, Rev 1, Verification and Validation Test Plan for Bechtel's ME150 Pipe Support Family of Programs (PCFAPPS)	The Pipe Support Design Criteria considers all load types identified in ASME B31.3 and utilizes ASME Section III, Division 1, Subsection NF and Appendix F to supplement the requirements of ASME B31.3 for seismic design of SC-I/II and SC-III/IV pipe supports. Bounding load cases are passed to the pipe support designers from the results of the ancillary equipment piping stress analyses. Details of the seismic design methodology are discussed in the Pipe Support Design Criteria document. Analysis is by manual calculation and computer programs that have been tested and approved as discussed in the Verification and Validation Test Plan for Bechtel's ME150 Pipe Support Family of Programs (PCFAPPS). The Ancillary Equipment Pipe Support Design document shows examples of typical equipment supports. These are appropriate codes and standards for design of the LOP system ancillary equipment supports. Ancillary equipment supports are to be designed to allow a minimum of heat to be transferred to the building structures (building structures not to exceed 150 °F for concrete and 200 °F for steel). Design standards for vessel internal equipment supports are discussed in the integrity assessment for the LOP system vessels (SBS, SBS Condensate, and WESP).

Information Assessed		Source of Information	Assessment
Connections	Seams and connections are adequately designed.	24590-WTP-DB-ENG-01-001, Rev 1A, Basis of Design; 24590-WTP-DC-PS-01-001, Rev. 2, Pipe Stress Design Criteria including "Pipe Stress Criteria" and "Span Method Criteria"; ASME Boiler and Pressure Vessel (B&PV) Code, Section IX, Welding and Brazing Qualifications; ASME/ANSI B16.5, 1988 Edition, Piping Flanges and Flanged Fittings; 24590-WTP-PER-PL-02-001, Rev. 5, Piping Material Class Description; 24590-WTP-3PB-P000-TN13A, Rev. 6, Piping Material Classification, Pipe Class N13A: 24590-WTP-3PS-PS02-T00001, Rev. 2, Shop Fabrication of Piping; 24590-WTP-MX00-TP001, Rev. 1, Process Bulge Design and Fabrication	The Basis of Design states that in-cell piping that is non-maintainable will be fully welded. The Pipe Stress Design Criteria document specifies the ASME B31.3 Process Piping design code for the piping systems. Welding is to be performed in accordance with the requirements of ASME B31.3 and the ASME B&PV Code, Section IX. Flange connections and piping buttwelds are to be designed in accordance with ANSI B16.5 as called out by piping material class. Process piping within bulges is designed and fabricated in accord with *Shop Fabrication of Piping* which requires welding to standards of ASME B&PV Section IX, and inspected in accord with test methods of ASME B&PV Section V as appropriate (this section addresses visual, liquid penetrant, and radiographic methods), and allows pressure testing of fabricated components, and requires pressure testing of installed piping. Bulges are required to be welded to standards of ASME B&PV Section IX, and inspected in accord with test methods of ASME B&PV Section V as appropriate. These are appropriate codes and standards for design and fabrication of the LOP system ancillary equipment and bulges as secondary containment.
Supports	The system will withstand the effects of frost heave.	System Description listed above under References; 24590-WTP-DC-ST-01-001, Rev. 2, Structural Design Criteria	The ancillary equipment associated with the LOP system considered in this assessment is located in above grade process cells and bulges inside the Low Activity Waste (LAW) Vitrification Facility. The Structural Design Criteria requires that all structural foundations shall extend into the surrounding soil below the frost line to preclude frost heave. The frost line is 30 in. below grade. The LAW building foundations are not subject to frost heave; therefore, the ancillary equipment located inside the building is not subject to frost heave.

Information Assessed		Source of Information	Assessment
Waste Characteristics	Characteristics of the waste to be stored or treated have been identified (ignitable, reactive, toxic, specific gravity, vapor pressure, flash point, temperature)	System Description and Process Flow Diagrams listed above under References; 24590-WTP-PSAR-ESH-01-002-03, Rev. 1, Preliminary Safety Analysis Report to Support Construction Authorization: LAW Facility Specific Information; 24590-WTP-PER-PR-03-002, Rev. 1, Toxic Vapors and Emissions from WTP Tank Systems and Miscellaneous Treatment Unit Systems	The PSAR, a reference to 24590-WTP-PER-PR-03-002, provides a summary of potential hazardous conditions associated with each LOP vessel and the associated ancillary equipment. Design provisions for control of these hazards are listed in the PSAR, the System Description and 24590-WTP-PER-PR-03-002 including HEPA filtration for particulates and aerosols, caustic scrubbing for acid gases, thermal catalytic oxidation for organic compounds, and selective catalytic reduction for nitrogen oxides. The LOP system description identifies the safety functions for ancillary equipment to include maintaining the confinement boundary of the offgas stream and ensuring that the flow path between the melters and the stack remains unobstructed during and following a SC-III seismic event. The LOP System provides a primary pressure and fluid boundary to protect facility workers from the hazardous materials in the melter offgas and condensate streams. Ancillary equipment associated with the LOP handles hot acidic melter offgas, the melter offgas condensate, and WESP washdown liquors. Demineralized water is received for SBS column vessels (LOP-SCB-00001/2) and SBS condensate vessels (LOB-VSL-00001/2) initial inventories, makeup, and equipment washdown as shown on the Process Flow Diagram. The primary function of the ancillary equipment associated with the LOP System is to provide a primary pressure and fluid boundary to protect facility workers from the hazardous materials in the melter offgas and condensate streams. The LAW melter offgas system is designated Important To Safety to prevent exposing workers to a NO_x release.

Information Assessed		Source of Information	Assessment
Waste Characteristics	Ancillary equipment is designed to handle the wastes with the characteristics defined above and any treatment reagents.	System Description and Drawings listed above under References; 24590-WTP-PER-M-02-002, Rev 1, Materials for Ancillary Equipment; 24590-WTP-PER-PL-02-001, Rev. 5, Piping Material Class Description; 24590-WTP-3PB-P000-TN13A, Rev. 6, Piping Material Classification, Pipe Class N13A; 24590-WTP-MX00-TP001, Rev. 1, Process Bulge Design and Fabrication; 24590-LAW-MXD-LOP-00001, Rev. B, Mechanical Data Sheet: Process Bulge, LOP-BULGE-00001; 24590-LAW-MXD-LOP-00002, Rev. B, Mechanical Data Sheet: Process Bulge, LOP-BULGE-00002	The System Description indicates that the LOP receives the melter offgas at the film cooler at melter plenum temperatures of 400°C to 600°C and are cooled with the injection of air or air/steam in order to inhibit solids condensation and aggregation in the offgas spool entering the submerged bed scrubber. Although primarily water vapors, the melter offgas contains acid gas components which necessitate high alloy material selections. The spools and bellows between the film coolers and the Submerged Bed Scrubbers are anticipated to be of such high alloy composition but are not within the scope of this assessment. The SBS column vessel and SBS condensate vessel are specified as Hastelloy C-22, while the WESP is specified as AL-6XN. In agreement with the Materials for Ancillary Equipment document which requires that the material selection and corrosion/erosion allowances for ancillary equipment in contact with the waste will be equal to or better than the material and corrosion allowance of the waste source vessels except as noted therein, the SBS column vessel offgas piping is specified as AL-6XN (6% Mo) with a 0.0425" corrosion allowance due to the potentially aggressive characteristics of this offgas. The offgas continues to be vented in AL-6XN piping through the WESP and up to the point of aggregation with the vessel ventilation system entering the LAW secondary offgas processing system (LVP). Condensates from the offgas are transferred within Hastelloy C-22 piping and valves, while the LOP bulges (handling the condensates and internally decontaminable with demineralized water) have floor drains and drain lines of AL-6XN. Bulge mechanical data sheets and design specifications indicate bulge construction is to QL-CM and SC-III of 0.25" 316L Stainless Steel with hydrostatic test and a washring and demineralized water. Additional reagents are not added to this system during normal operations.

Information Assessed		Source of Information	Assessment
Compatibility	The pH range of the waste, waste temperature and the corrosion behavior of the structural materials are adequately addressed. Ancillary equipment material and protective coatings ensure the ancillary equipment structure is adequately protected from the corrosive effects of the waste stream and external environments. The protection is sufficient to ensure the equipment will not leak or fail for the design life of the system.	System Description and vessel material selection data sheets listed above under References; 24590-WTP-DB-ENG-01-001, Rev 1A, Basis of Design; 24590-WTP-PER-M-02-002, Rev 1, Materials for Ancillary Equipment; 24590-WTP-3PS-NN00-T0001, Rev 0, Engineering Specification for Hot and Anti-Sweat Thermal Insulation	The Basis of Design identifies a service design life of 40 years for the ancillary equipment. All non-maintainable items will be designed to last the life of the facility. Detailed material selection (corrosion) analyses were conducted for the LAW Primary Offgas vessels in the LAW facility process design. The Materials for Ancillary Equipment document requires that the material selection and corrosion/erosion allowances for ancillary equipment in contact with the waste will be equal to or better than the material and corrosion allowance of the waste source vessels except as noted therein. The Thermal Insulation specification requires that all insulating materials used on the outside of ancillary equipment be pre-approved for use on austenitic stainless steel in accordance with applicable ASTM procedures and tests to preclude external corrosion of ancillary equipment. Corrosion allowances are considered for all ancillary equipment, therefore, the ancillary equipment will provide the expected design service life.

Information Assessed		Source of Information	Assessment
Corrosion Allowance	Corrosion allowance is adequate for the intended service life of the ancillary equipment.	Drawings listed above under References; 24590-WTP-DC-PS-01-001, Rev. 2, Pipe Stress Design Criteria including "Pipe Stress Criteria" and "Span Method Criteria"; 24590-WTP-DB-ENG-01-001, Rev 1A, Basis of Design; 24590-WTP-PER-M-02-002, Rev 1, Materials for Ancillary Equipment; 24590-WTP-PER-PL-02-001, Rev. 5, Piping Material Class Description; 24590-WTP-3PB-P000-TN13A, Rev. 6, Piping Material Classification, Pipe Class N13A	The Pipe Stress Design Criteria document requires use of the ASME B31.3 Code for ancillary equipment design. Consideration of corrosion, including corrosion allowance, is a mandatory requirement of ASME B31.3. A required service design life of 40 years is identified in the Basis of Design for ancillary equipment located in inaccessible process cells. The LAW facility process cells are not inaccessible but can be accessed should sufficient need arise; jumpers, pumps, piping, and valves associated with this system may be replaced upon access through the floor of Room L-0202. Detailed material selection (corrosion) analyses were conducted for the LAW Primary Offgas vessels in the LAW facility process design. The Materials for Ancillary Equipment document requires that downstream ancillary equipment is to be constructed of equal or better materials than the source vessel, and with the same corrosion allowance as the source vessel except as noted therein. Bounding corrosion allowances are listed for each piping material class in the Piping Material Class Description document with 0.040" for Inconel 625 (melter offgas) and Hastelloy C-22 (condensate) and 0.0425" for AL-6XN (scrubber offgas) piping. These requirements are adequate to assure the ancillary equipment provides the intended service life.
Strength	Pressure controls (vents and relief valves) are adequately designed to ensure pressure relief if normal operating pressures in the vessels are exceeded.	Drawings listed above under References; 24590-WTP-DC-PS-01-001, Rev. 2, Pipe Stress Design Criteria including "Pipe Stress Criteria" and "Span Method Criteria"; 24590-WTP-PER-PL-02-001, Rev. 5, Piping Material Class Description	The Pipe Stress Design Criteria document specifies use of ASME B31.3 as the design code for the WTP ancillary equipment. ASME B31.3 requires provision be made to safely contain or relieve any pressure to which the ancillary equipment may be subjected. ASME B31.3 piping not protected by a pressure relieving device, or that can be isolated from a pressure reliving device must be designed for at least the highest pressure that can be developed. Bounding pressure and temperature limits are listed for each of the piping material classes in the Piping Material Class Description document and are adequate to meet the ASME B31.3 requirements for pressure control.

Information Assessed		Source of Information	Assessment
	Maximum flows and any unusual operating stresses are identified	Drawings listed above under References; 24590-WTP-DC-PS-01-001, Rev 2, Pipe Stress Design Criteria including "Pipe Stress Criteria" and "Span Method Criteria"; 24590-WTP-PER-PL-02-001, Rev. 5, Piping Material Class Description	The expected flow paths for the ancillary equipment are identified on the P&ID drawings. The Pipe Stress Design Criteria document specifies the ASME B31.3 code for piping design. This code requires piping to be designed to the highest pressure that can be developed in a piping system assuring that maximum operating stresses remain within code allowables. The Piping Material Class Description document lists the bounding pressure and temperature limits for each piping material class.
Secondary Containment	Ancillary equipment is designed with secondary containment that is constructed of materials compatible with the waste and of sufficient strength to prevent failure (pressure gradients, waste, climatic conditions, daily operations), provided with a leak-detection system, and designed to drain and remove liquids.	Drawings and System Description listed above under References; 24590-WTP-MX00-TP001, Rev. 1, Process Bulge Design and Fabrication; 24590-LAW-MXD-LOP-00001, Rev. B, Mechanical Data Sheet: Process Bulge, LOP-BULGE-00001; 24590-LAW-MXD-LOP-00002, Rev. B, Mechanical Data Sheet: Process Bulge, LOP-BULGE-00002	The ancillary equipment considered in this assessment is located in above grade process cells and within process bulges. The SBS column vessel, SBS Condensate Vessel, and WESP are housed within Room L-0123 for Melter 1 and Room L-0124 for Melter 2. Rooms L-0123 and L-0124 are provided with liners and sumps as appropriate and outside of the scope of this integrity assessment. The SBS Purge pumps LOP-PMP-00003A/B and -0006A/B are present on elevated platforms within Rooms L-0123 and L-0124, respectively. The Process bulges LOP-BULGE-00001 and -00002, which house pipe valving outside of the process cell for the condensate streams are present in Room L-0202 on Elevation 28' 0", and constitute secondary containment for the piping, valves, and fittings. Each bulge is fabricated of 0.25" 316L SS, compatible with the waste materials, and each is designed with a washring and demineralized water supply and an AL-6XN floor drain line which routes suspect liquids back into the process cell sump. Secondary containment for ancillary equipment within the cells is provided by the liners and sumps as appropriate and is outside the scope of this integrity assessment.

Bechtel National, Inc.

Job No. 24590

SUPPLIER DOCUMENT STATUS

1. [X] **Work may proceed.**
2. [ ] **Revise and resubmit. Work may proceed subject to resolution of indicated comments.**
3. [ ] **Revise and resubmit. Work may not proceed.**
4. [ ] **Review not required. Work may proceed.**

Permission to proceed does not constitute acceptance or approval of design details, calculations, analyses, test methods, or materials developed or selected by the supplier and does not relieve supplier from full compliance with contractual obligations.

REVIEWED

G-321 Document Category N/A
[From Supplement A to G-321-E (E) or G-321-V (V), as applicable, or "N/A" if SSRS is used]

Supersedes BNI Document No. N/A Rev.
[When applicable]

Accepted by DC Pfluger (Print Name) [signature] (Signature) 7/23/04 (Date)

Released by
[When applicable] ______ Print Name ______ Signature ______ Date

416 GP&S 7-03

24590-CM-HC4-HXYG-00138-02-00038

REV. 00A

~~PURCHASE ORDER~~ SUBMITTAL

Subcontract

Best Available Copy

R10339684

STRUCTURAL INTEGRITY ASSESSMENT OF THE LOW-ACTIVITY WASTE (LAW) SECONDARY OFFGAS SYSTEM (LVP) CAUSTIC COLLECTION TANK (LVP-TK-00001)

COGEMA-IA-063

Rev. 0

Please note that source, special nuclear and byproduct materials, as defined in the Atomic Energy Act of 1954 (AEA), are regulated at the U.S. Department of Energy (DOE) facilities exclusively by DOE acting pursuant to its AEA authority. DOE asserts, that pursuant to the AEA, it has sole and exclusive responsibility and authority to regulate source, special nuclear, and byproduct materials at DOE-owned nuclear facilities. Information contained herein on radionuclides is provided for process description purposes only.

24590-CM-HC4-HXYG-00138-02-00038, REV. 00A

IQRPE REVIEW
OF
THE LOW-ACTIVITY WASTE (LAW) SECONDARY OFFGAS SYSTEM (LVP)
CAUSTIC COLLECTION TANK (LVP-TK-00001)

"I, Tarlok Hundal have reviewed, and certified a portion of the design of a new tank system or component located at the Hanford Waste Treatment Plant, owned/operated by Department of Energy, Office of River Protection, Richland, Washington. My duties were independent review of the current design for the Low Activity Waste Secondary Offgas System Caustic Collection Tank (LVP-TK-00001) as required by The Dangerous Waste Regulations, namely, WAC 173-303-640(3) applicable paragraphs, i.e., (a) through (g)."

"I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment."

The documentation reviewed indicates that the design intent fully satisfies the requirements of the WAC.

The attached review is five (5) pages numbered one (1) through five (5).

TARLOK SINGH HUNDAL
STATE OF WASHINGTON
20213
REGISTERED
PROFESSIONAL ENGINEER
EXPIRES: 02/15/06

T S Hundal

Signature

7-22-04

Date

Scope	Scope of this Integrity Assessment	This Integrity Assessment is for one LAW Secondary Offgas/Vessel Vent Process (LVP) System, Caustic Collection Tank (LVP-TK-00001), located in room L-0218, at Elevation 28'-0" of the LAW Vitrification Building.
References	Specifications, Drawings and Mechanical Data Sheets	The following applicable Specifications are listed in Material Requisition No. 24590-CM-MRC-MVA0-00002, Rev. 1: Engineering Specification for Seismic Qualification Criteria for Pressure Vessels; General Specification for Supplier Quality Assurance Program Requirements; Specification for Positive Material Identification (PMI); General Specification for Packing, Shipping, Handling, and Storage Requirements; Engineering Specification for Structural Design Loads for Seismic Category III and IV Equipment and Tanks; Specification for Tank Welding. Drawings: 24590-LAW-MV-LVP-00004, Rev. 0, Equipment Assembly LAW Caustic Collection Tank (LVP-TK-00001); 24590-LAW-P1-P01T-P0002, Rev. 3, LAW Vitrification Building General Arrangement Plan at El. 3'-0"; 24590-LAW-P1-P01T-P0004, Rev. 0, LAW Vitrification Building General Arrangement Plan at El. 28'-0"; 24590-LAW-P1-P01T-P0007, Rev. 5, LAW Vitrification Building General Arrangement Section A-A, B-B, and C-C; 24590-LAW-P1-P01T-P0009, Rev. 5, LAW Vitrification Building General Arrangement Section G-G, H-H, and J-J; 24590-LAW-M5-V17T-P0011, Rev. 0, Process Flow Diagram LAW VIT Secondary Offgas Treatment (System LVP); 24590-LAW-M6-LVP-P0002, Rev. 1, P & ID-LAW Secondary Offgas/Vessel Vent Process System and Stack Discharge Monitoring System (Q). Mechanical Data Sheet: 24590-LAW-MTD-LVP-00001, Rev. 0, LAW Caustic Collection Tank (LVP-TK-00001).
Summary of Assessment		For each item of "Information Assessed" (i.e., Criteria) on the following pages, the items listed under "Source of Information" were reviewed and found to furnish adequate design controls and requirements to ensure the design intent fully satisfies the requirements of Washington Administrative Code, WAC-173-303-640, *Dangerous Waste Regulations* for Tank Systems.

	Information Assessed	Source of Information	Assessment
Design	Tank design standards are appropriate and adequate for the tank's intended use.	Specifications listed under Material Requisition, Drawings, and Mechanical Data Sheet listed above under References; American Petroleum Institute standard, API-650, Welded Steel Tanks for Oil Storage. 24590-LAW-3YD-LOP-00001, Rev. 0, System Description for LOP and LVP: LAW Melter Offgas.	The LAW Caustic Collection Tank, LVP-TK-00001is to be designed to the API 650 standard applicable requirements, which are appropriate for the tank operating with waste liquid within the pressure and temperature ranges specified for this tank. The tank's quality level is to be commercial (CM) grade and its seismic category (SC) is to be SC-III. Supplementary requirements are specified in the Engineering Specifications listed under References. Supplementary requirements address the tank design, positive material identification, lifting attachment design, fabrication tolerances, acceptable welding procedures for the tank, welder qualifications and testing records, NDE inspections and records, and lifting, packaging, shipping, handling and storage requirements. As discussed above, the design standards are appropriate and adequate for the tank's intended use. The LAW Caustic Collection Tank, LVP-TK-00001 is a vertical tank with a 13 ft ID and a height of 14 ft 4 in. with a self supporting cone roof. The cone roof is built with a 1/4" minimum thick plate. The shell and bottom floor are specified to be made of 5/16" minimum thick plates. The tank is anchored to the concrete floor at Elev. 28'-0". Material for the shell, cone roof, and bottom floor is SA-240 316 stainless steel (0.030% maximum carbon content, dual certified), hereafter will be referred to as 316. The tank has internal piping, spray nozzle, and other appurtenances made of other grades of stainless steel material. Tank's operating volume is to be about 11,919 gallons and the total internal volume is to be about 14,232 gallons.
	If a non-standard tank is to be used, the design calculations demonstrate sound engineering principles of construction.	Specifications listed under Material Requisition, Drawings, and Mechanical Data Sheet listed above under References; American Petroleum Institute standard, API-650, Welded Steel Tanks for Oil Storage.	The LAW Caustic Collection Tank, LVP-TK-00001 is a standard API -650 tank. The Mechanical Data Sheet requires that the API-650 tank be delivered after design, fabrication, inspection and testing per API-650 standard. Supplemental design information is provided by the reference documents listed in the Source of Information column for utilizing sound engineering principles of construction of the tank.

	Information Assessed	Source of Information	Assessment
Design	Tank has adequate strength, after consideration of the corrosion allowance, to withstand the operating pressure, operating temperature, and seismic loads.	Specifications listed under Material Requisition, Drawings, and Mechanical Data Sheet listed above under References; American Petroleum Institute standard, API-650, Welded Steel Tanks for Oil Storage; 24590-LAW-3YD-LOP-00001, Rev. 0, System Description for LOP and LVP: LAW Melter Offgas (Including System Description Change Notice 24590-LAW-3YN-LOP-00001).	The Mechanical Data Sheet identifies the tank's operating pressure and temperature ranges, the materials selected for the tank, the corrosion allowance, and the tank quality level which determines the requirements for seismic design. The API-650 standard and supplement specifications for the tank require specific consideration of the operating pressures, temperatures, and seismic loads in the design process. API-650 standard requires that corrosion allowance thickness be added to the nominal tank design thickness when evaluating the adequacy of the tank components for these loads at end of life. Detailed requirements for seismic load determination are furnished in the specification for Seismic Category III/IV Equipment and Tanks. These codes and standards are adequate and appropriate for design of this LVP tank to withstand operating pressure loads, temperature loads, and seismic loads for its specified design life.
Foundation	Tank foundation will maintain the load of a full tank.	American Petroleum Institute standard, API-650, Welded Steel Tanks for Oil Storage; 24590-WTP-DB-ENG-01-001, Rev. 1B, Basis of Design.	The API-650 standard specifies the requirements for the design of the tank supports and ensures their adequate design. Chapter 14 of the Basis of Design document requires that tank foundations design must be adequate to support the loads from full tanks.
	If in an area subject to flooding, the tank is anchored.	Drawings listed under References; 24590-LAW-3YD-LOP-00001, Rev. 0, System Description for LOP and LVP: LAW Melter Offgas (Including System Description Change Notice 24590-LAW-3YN-LOP-00001).	The drawings show and the System Description document states that the tank overflows to the berm around the tank and the berm in turn drains thru a floor drain to the Plant Wash Tank (RLD-VSL-0003) located at lower floor (Elev. 3'-0"), therefore, flooding is not a credible event. However, the tank is anchored to the concrete floor.
	Tank system will withstand the effects of frost heave.	Drawings listed under References; 24590-WTP-DC-ST-01-001, Rev. 2, Structural Design Criteria.	The Structural Design Criteria requires that all outdoor structural foundations shall extend into the surrounding soil below the 30 in. frost line; to preclude any frost heave effects. As shown on the drawings, the tank is located inside/interior of the building at above grade (at floor Elev. 28'-0"), therefore, the tank foundation is not subject to frost heave.

	Information Assessed	Source of Information	Assessment
Waste Characteristics	Characteristics of the waste to be stored or treated have been identified (ignitable, reactive, toxic, specific gravity, vapor pressure, flash point, storage temperature)	Mechanical Data Sheet listed above under References; Plant Item Material Selection Data Sheet, 24590-LAW-N1D-LVP-P0002, Rev. 0, LVP-TK-00001 (LAW) Caustic Collection Tank ; 24590-WTP-PSAR-ESH-01-002-03, Rev. 1, Preliminary Safety Analysis Report to Support Construction Authorization: LAW Facility Specific Information; WA7890008967, *Dangerous Waste Portion of the Hanford Facility Resource Conservation and Recovery Act Permit for the Treatment, Storage, and Disposal of Dangerous Waste,* Chapter 10, and Attachment 51, " Waste Treatment and Immobilization Plant."	The Mechanical Data Sheet presents the waste specific gravity, storage temperatures and pressures. The Plant Item Material Selection Data Sheet addresses the pH range and chemical composition of the waste to select appropriate tank materials and specify the corrosion allowance. Other waste characteristics that are hazardous, such as ignitability, reactivity, and toxicity are addressed by the Preliminary Safety Analysis Report for the LAW Vitrification Building and in Part A of the Permit as an integral part of the design process. The LVP tank provides primary confinement of the waste during normal operations, abnormal operations and during and after a Design Basis Earthquake. The tank is vented via a vent at the top to prevent any build-up of flammable gases. The tank is grounded to control ignition sources.
	Tank is designed to store or treat the wastes with the characteristics defined above and any treatment reagents.	Plant Item Material Selection Data Sheet, 24590-LAW-N1D-LVP-P0002, Rev. 0, LVP-TK-00001 (LAW) Caustic Collection Tank ; 24590-LAW-3YD-LOP-00001, Rev. 0, System Description for LOP and LVP: LAW Melter Offgas (Including System Description Change Notice 24590-LAW-3YN-LOP-00001).	The Plant Item Material Selection Data Sheet demonstrates that the tank is designed to process the wastes discussed above. The System Description discusses normal and abnormal operations for the LVP tank. To neutralize the collected acid gases, a 5 molar sodium hydroxide solution is added to the Caustic Collection Tank. A spray jet nozzle is provided for washdown during maintenance periods.
	The waste types are compatible with each other.	Drawings listed above under References; 24590-LAW-3YD-LOP-00001, Rev. 0, System Description for LOP and LVP: LAW Melter Offgas (Including System Description Change Notice 24590-LAW-3YN-LOP-00001).	The System Description for the LAW (LVP) does not describe any operations where incompatible wastes are mixed in this tank for processing. The LVP tank receives scrubbing liquid from the Caustic Scrubber (LVP-SCB-00001), located at upper floor (Elev. 48'-0") as shown in drawings and as described in the System Description document. The tank is designed to hold the caustic scrubbing liquid up to 2 days. The collected waste is routinely pumped to the LAW pretreatment facility Alkaline Effluent Tanks (RLD-VSL-00017A/B) via caustic blowdown pumps (LVP-PMP-00002A/B) for further processing.

	Information Assessed	Source of Information	Assessment
Corrosion Protection	Tank material and protective coatings ensure the tank structure is adequately protected from the corrosive effects of the waste stream and external environments (expected to not leak or fail for the design life of the system)	Drawings and Mechanical Data Sheet listed above under References; American Petroleum Institute standard, API-650, Welded Steel Tanks for Oil Storage. Plant Item Material Selection Data Sheet, 24590-LAW-N1D-LVP-P0002, Rev. 0, LVP-TK-00001 (LAW) Caustic Collection Tank ; 24590-LAW-3YD-LOP-00001, Rev. 0, System Description for LOP and LVP: LAW Melter Offgas (Including System Description Change Notice 24590-LAW-3YN-LOP-00001).	The Plant Item Material Selection Data Sheet shows that the LAW Caustic Collection Tank, LVP-VSL-00001 normally operates at atmospheric pressure, a pH of 9 (may be raised to 14), and at a temperature range of 142°F to 149°F. The tank is designed per API-650 standard and for a temperature of 180°F. Other pertinent tank operation and design information is provided in the Mechanical Data Sheet. Washdown of the tank is considered using the internal spray jet nozzle. The material selected is 316 and a corrosion allowance of 0.04 in. The LVP tank is located in the LAW facility room L-0218 at elevation 28'-0". This room is equipped with a berm which in turn drains to the Plant Wash Tank (RLD-VSL-00003) located at lower floor (Elev. 3'-0"). Therefore, the cell should remain dry during normal operations which will limit external corrosion of the tank over the facility design life.
Corrosion Allowance	Corrosion allowance is adequate for the intended service life of the tank.	Mechanical Data Sheet listed above under References; Plant Item Material Selection Data Sheet, 24590-LAW-N1D-LVP-P0002, Rev. 0, LVP-TK-00001 (LAW) Caustic Collection Tank.	The bases for the LVP tank's material selection and corrosion allowance are furnished in the Plant Item Material Selection Data Sheet. Selection of 316 material with a corrosion allowance of 0.04 in. for a service life of 40 years is adequate and appropriate. The material selection and corrosion allowance are carried forward to the Mechanical Data Sheet, consistently and correctly.
Pressure Relief	Pressure controls (vents and relief valves) are adequately designed to ensure pressure relief if normal operating pressures in the tank are exceeded.	Drawings listed above under References; 24590-LAW-3YD-LOP-00001, Rev. 0, System Description for LOP and LVP: LAW Melter Offgas (Including System Description Change Notice 24590-LAW-3YN-LOP-00001).	The LAW Caustic Collection Tank , LVP-VSL-00001 is provided with an unrestricted overflow through a 4" diameter pipe to the berm around the tank and the berm in turn drains to the Plant Wash Tank (RLD-VSL-00003) located at lower floor (Elev. 3'-0"), as shown on the drawings and described in the System Description document. The tank is also provided with a vent at its top to prevent any build up of gases.

R10341816

COGEMA-IA-064, Rev. 0

IQRPE REVIEW – LOW ACTIVITY WASTE (LAW) VITRIFICATION FACILITY ELEVATION 3'-0" PRIMARY OFFGAS SYSTEM (LOP) MISCELLANEOUS TREATMENT UNIT SUBSYSTEM EQUIPMENT

"I, John T. Baxter, have reviewed, and certified a portion of the design of a new tank system or component located at the Hanford Waste Treatment Plant, owned/operated by Department of Energy, Office of River Protection, Richland, Washington. My duties were independent review of the current design for the Low Activity Waste (LAW) Vitrification Facility Elevation 3'-0" Primary Offgas System (LOP) Miscellaneous Treatment Unit Subsystem Equipment as required by the Dangerous Waste Regulations, namely, WAC 173-303-640(3) applicable paragraphs, i.e., (a) through (g)."

"I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment."

The documentation reviewed indicates that the design intent fully satisfies the requirements of the WAC.

The attached review is seven (7) pages numbered one (1) through seven (7).

Bechtel National, Inc. Job No. 24590

SUPPLIER DOCUMENT STATUS

1. [X] **Work may proceed.**
2. [ ] **Revise and resubmit. Work may proceed subject to resolution of indicated comments.**
3. [ ] **Revise and resubmit. Work may not proceed.**
4. [ ] **Review not required. Work may proceed.**

Permission to proceed does not constitute acceptance or approval of design details, calculations, analyses, test methods, or materials developed or selected by the supplier and does not relieve supplier from full compliance with contractual obligations.

REVIEWED E&NS

G-321 Document Category N/A
[From Supplement A to G-321-E (E) or G-321-V (V), as applicable, or "N/A" if SSRS is used]

Supersedes BNI Document No. N/A Rev.
[When applicable]

Accepted by DCP... (Print Name) (Signature) 7/27/04 (Date)

Released by N/A (Print Name) (Signature) (Date)
[When applicable]

416 GP&S 7-03

JOHN T. BAXTER
STATE OF WASHINGTON
18978
REGISTERED PROFESSIONAL ENGINEER
07/28/04

EXPIRES: 10/28/ 2004

John T. Baxter
Signature

07/28/2004
Date

24590-QM-HC4-HXYG-00138-02-00040, REV. 00A
39
7-28-04

STRUCTURAL INTEGRITY ASSESSMENT OF THE LOW ACTIVITY WASTE (LAW) VITRIFICATION FACILITY ELEVATION 3'-0" PRIMARY OFFGAS SYSTEM (LOP) MISCELLANEOUS TREATMENT UNIT SUBSYSTEM EQUIPMENT

COGEMA-IA-064
REV. 0

Please note that source, special nuclear and byproduct materials, as defined in the Atomic Energy Act of 1954 (AEA), are regulated at the U.S. Department of Energy (DOE) facilities exclusively by DOE acting pursuant to its AEA authority. DOE asserts, that pursuant to the AEA, it has sole and exclusive responsibility and authority to regulate source, special nuclear, and byproduct materials at DOE-owned nuclear facilities. Information contained herein on radionuclides is provided for process description purposes only.

Scope	Scope of this Integrity Assessment	This integrity assessment includes: a. Miscellaneous Treatment Unit Subsystem equipment associated with the LAW Melter 1 offgas spools and bellows between the film coolers and the Submerged Bed Scrubber (SBS) as shown on drawing 24590-LAW-M6-LOP-P0001, Rev. 1. b. Miscellaneous Treatment Unit Subsystem equipment associated with the LAW Melter 2 offgas spools and bellows between the film coolers and the Submerged Bed Scrubber (SBS) as shown on drawing 24590-LAW-M6-LOP-P0002, Rev. 1.
References	Drawings and System Description	24590-LAW-3YD-LOP-00001, Rev. 0, System Description for LOP and LVP: LAW Melter Offgas; System Description Change Notice (SDCN) No. 24590-LAW-3YN-LOP-00001 to 24590-LAW-3YD-LOP-00001, Rev. 0 24590-LAW-M5-V17T-P0007, Rev. 0, Process Flow Diagram LAW Melter 1 Primary Offgas Treatment System (System LOP); 24590-LAW-M5-V17T-P0008, Rev. 0, Process Flow Diagram LAW Melter 2 Primary Offgas Treatment System (System LOP); 24590-LAW-M6-LOP-P0001, Rev. 1, P & ID-LAW Primary Offgas Process System Melter 1; 24590-LAW-M6-LOP-P0002, Rev. 1, P & ID-LAW Primary Offgas Process System Melter 2; 24590-LAW-P1-P01T-P0002, Rev. 3, LAW Vitrification Building General Arrangement Plan at El. 3'-0"; 24590-LAW-P1-P01T-P0007, Rev. 5, LAW Vitrification Building General Arrangement Section A-A, B-B, and C-C
References	Plant Item Material Selection Data Sheets	24590-LAW-N1D-LOP-P0004, Rev. 0, Plant Item Material Selection Data Sheet, LOP Offgas Piping (downstream of film cooler to SBS entry)

Summary of Assessment For each item of "Information Assessed" (i.e., Criteria) on the following pages, the items listed under "Source of Information" were reviewed and found to furnish adequate design controls and requirements to assure the design intent fully satisfies the WAC requirements.

	Information Assessed	Source of Information	Assessment
Design	MTU Subsystem equipment design standards are appropriate and adequate for the equipment's intended use.	Drawings and Plant Item Material Selection Data Sheet listed above under References; 24590-WTP-DC-PS-01-001, Rev. 3, Pipe Stress Design Criteria including "Pipe Stress Criteria" and "Span Method Criteria"; ASME B31.3 Code, Process Piping, 1996 Edition, American Society of Mechanical Engineers; 24590-LAW-N1D-LOP-P0004, Rev. 0, Plant Item Material Selection Data Sheet, LOP Offgas Piping (downstream of film cooler to SBS entry)	The Pipe Stress Design Criteria document identifies ASME B31.3 as the design code for piping systems of the WTP. The Miscellaneous Treatment Unit (MTU) Subsystem equipment (bellows and spools) are Quality Level-1 (QL-1) and specified Important to Safety with seismic protection to ensure continued function during normal operations, abnormal operations, and during and after a Seismic Category (SC-III) Design Level Seismic Event. The Seismic Categories and Quality Levels are explained in detail in the Pipe Stress Design Criteria document. The materials selected for the offgas spools and bellows is Inconel, Alloys 625/690 for the spools, and Alloy 625LCF for the bellows, as noted in the Plant Item Material Selection Data Sheet. These codes and standards are acceptable and adequate for the design of the MTU Subsystem equipment for the intended service.
	If MTU Subsystem equipment to be used is not built to a design standard, the design calculations demonstrate sound engineering principles of construction.	24590-WTP-DC-PS-01-001, Rev. 3, Pipe Stress Design Criteria including "Pipe Stress Criteria" and "Span Method Criteria"; 24590-WTP-3PS-PF00-TP001, Rev. 0, Engineering Specification for Shop Fabrication of LAW Melter Piping and Components	The MTU Subsystem equipment is built to design and fabrication standards. The Pipe Stress Design Criteria and shop fabrication documents specify that piping is to be designed, assembled, and tested in accordance with ASME B31.3.

	Information Assessed	Source of Information	Assessment
Design	MTU Subsystem equipment has adequate strength at the end of its design life to withstand the operating pressure, operating temperature, thermal expansion, and seismic loads. Equipment is protected against physical damage and excessive stress due to settlement, vibration, expansion, or contraction.	24590-WTP-DB-ENG-01-001, Rev 1B, Basis of Design; 24590-WTP-DC-PS-01-001, Rev. 3, Pipe Stress Design Criteria including "Pipe Stress Criteria" and "Span Method Criteria"; 24590-WTP-VV-PS-01-001, Rev. 2, Verification and Validation Report for ME101, Linear Elastic Analysis of Piping, Version N8	The Basis of Design document specifies that this mechanical equipment be designed for a nominal system life of 5 years. The Pipe Stress Design Criteria document requires the use of the ASME B31.3 Code for piping design. ASME B31.3 requires explicit consideration of many loadings including operating pressure, operating temperature, thermal expansion/contraction, settlement, vibration, and corrosion allowance in the design of piping. Details of the seismic design methods are discussed in the Pipe Stress Design Criteria document. Design is by hand calculations and computer codes that have been tested and approved as discussed in the Verification and Validation Report for ME101, Linear Elastic Analysis of Piping, Version N8. These are adequate and appropriate codes and standards to ensure that the ancillary equipment will have adequate strength at end of design life to withstand all anticipated loadings.
Supports	MTU Subsystem equipment supports are adequately designed.	Drawings listed above under references; 24590-WTP-DC-PS-01-002, Rev 2, Pipe Support Design Criteria; 24590-WTP-PER-PS-02-001, Rev. 4, Ancillary Equipment Pipe Support Design; ASME B31.3 Code, Process Piping, 1996 Edition, American Society of Mechanical Engineers; 24590-WTP-PL-PS-01-001, Rev 1, Verification and Validation Test Plan for Bechtel's ME150 Pipe Support Family of Programs (PCFAPPS)	The Pipe Support Design Criteria considers all load types identified in ASME B31.3. Bounding load cases are passed to the pipe support designers from the results of the ancillary equipment piping stress analyses. Details of the seismic design methodology are discussed in the Pipe Support Design Criteria document. Analysis is by manual calculation and computer programs that have been tested and approved as discussed in the Verification and Validation Test Plan for Bechtel's ME150 Pipe Support Family of Programs (PCFAPPS). The Ancillary Equipment Pipe Support Design document, applicable to this equipment, shows examples of typical equipment supports. These are appropriate codes and standards for design of the LOP system MTU Subsystem equipment supports. MTU Subsystem equipment supports are to be designed to allow a minimum of heat to be transferred to the building structures (building structures not to exceed 150 °F for concrete and 200 °F for steel).

Information Assessed		Source of Information	Assessment
Connections	Seams and connections are adequately designed.	Drawings listed above under references; 24590-WTP-DB-ENG-01-001, Rev 1B, Basis of Design; 24590-WTP-DC-PS-01-001, Rev. 3, Pipe Stress Design Criteria including "Pipe Stress Criteria" and "Span Method Criteria"; 24590-LAW-3PS-PF00-TP001, Rev. 0, Shop Fabrication of LAW Melter Piping and Components	The Pipe Stress Design Criteria document specifies the ASME B31.3 Process Piping design code for the piping systems. Welding is to be performed in accordance with the requirements specified in the Shop Fabrication of LAW Melter Piping and Components document. The P&ID drawings show that the demountable spools will be equipped with HILTAP connectors which are a proprietary high temperature aerospace quick-disconnect connection system. These are appropriate codes and standards for design and fabrication of the LOP system MTU equipment seams and connections.
Supports	The system will withstand the effects of frost heave.	System Description listed above under References; 24590-WTP-DC-ST-01-001, Rev. 2, Structural Design Criteria	The LOP system offgas lines and bellows considered in this assessment are located in above grade melter and process cells inside the Low Activity Waste (LAW) Vitrification Facility as discussed in the System Description.. The Structural Design Criteria requires that all structural foundations shall extend into the surrounding soil below the frost line to preclude frost heave. The frost line is 30 in. below grade. The LAW building foundations are not subject to frost heave; therefore, the LOP MTU Subsystem equipment located inside the building is not subject to frost heave.
Waste Characteristics	Characteristics of the waste to be stored or treated have been identified (ignitable, reactive, toxic, specific gravity, vapor pressure, flash point, temperature)	System Description listed above under references	The LOP system description identifies the safety functions for MTU Subsystem equipment to include maintaining the confinement boundary of the offgas stream and ensuring that the flow path between the melters and the stack remains unobstructed during normal operations, abnormal operations, and during and following a SC-III Design Level seismic event. The LOP System provides a primary pressure and fluid boundary to protect facility workers from the hazardous materials in the melter offgas consisting of high temperature acidic offgas (NOx), steam and air as discussed in the System Description.

	Information Assessed	Source of Information	Assessment
Waste Characteristics	MTU Subsystem equipment is designed to handle the wastes with the characteristics defined above and any treatment reagents.	System Description and Drawings listed above under References; 24590-LAW-N1D-LOP-P0004, Rev. 0, Plant Item Material Selection Data Sheet, LOP Offgas Piping (downstream of film cooler to SBS entry)	The System Description indicates that the LOP MTU Subsystem equipment receives the melter offgas at the film cooler at melter plenum temperatures of 400°C to 600°C and are cooled with the injection of air or air/steam in order to inhibit solids condensation and aggregation in the offgas spool entering the submerged bed scrubber. Although primarily water vapors, the melter offgas contains acid gas components which necessitate high alloy material selections. The Plant Item Material Selection Data Sheet lists the materials selected for the offgas spools and bellows as Inconel; Alloys 625/690 for the spools, and Alloy 625LCF for the bellows. This material selection data sheet recommends no corrosion allowances for this five-year design life equipment. Based on the discussion in the System Description, no reagents are added to these offgas lines and bellows during normal and abnormal operations. This design is adequate to meet the service life for the defined waste characteristics.
Compatibility	The pH range of the waste, waste temperature and the corrosion behavior of the structural materials are adequately addressed. MTU Subsystem equipment material and protective coatings ensure the MTU Subsystem equipment structure is adequately protected from the corrosive effects of the waste stream and external environments. The protection is sufficient to ensure the equipment will not leak or fail for the design life of the system.	Drawings and System Description listed above under references; 24590-WTP-DB-ENG-01-001, Rev 1B, Basis of Design; 24590-LAW-N1D-LOP-P0004, Rev. 0, Plant Item Material Selection Data Sheet, LOP Offgas Piping (downstream of film cooler to SBS entry)	The Basis of Design identifies a service design life of 5 years for this MTU Subsystem equipment, offgas spools and bellows. Details of the material selection for the spools and bellows are discussed in the Plant Item Material Selection Data Sheet. Little corrosion is anticipated for the Inconel alloy components as discussed in the data sheet. Notes on the P&ID drawings identify these spools and bellows as specialty items and that the Melter Systems design team will specify and procure the external insulation for these items.

Information Assessed		Source of Information	Assessment
Corrosion Allowance	Corrosion allowance is adequate for the intended service life of the MTU Subsystem equipment.	Drawings listed above under References; 24590-WTP-DC-PS-01-001, Rev. 3, Pipe Stress Design Criteria including "Pipe Stress Criteria" and "Span Method Criteria"; 24590-WTP-DB-ENG-01-001, Rev 1B, Basis of Design; 24590-LAW-N1D-LOP-P0004, Rev. 0, Plant Item Material Selection Data Sheet, LOP Offgas Piping (downstream of film cooler to SBS entry)	The Pipe Stress Design Criteria document requires use of the ASME B31.3 Code for ancillary equipment design of these offgas spools and bellows. Consideration of corrosion, including corrosion allowance, is a mandatory requirement of ASME B31.3. A minimum required service design life of 5 years is identified in the Basis of Design for the LAW melters and associated consumable equipment such as these spools and bellows. This equipment is accessible for service and replacement. The Plant Item Material Selection Data Sheet provides details of the material selection of Inconel Alloys 625/690 for the offgas spools and Alloy 625LCF for the bellows. No corrosion allowance is required because of the low anticipated corrosion rates under normal operating conditions and pressures (atmospheric).
Strength	Pressure controls (vents and relief valves) are adequately designed to ensure pressure relief if normal operating pressures in the vessels are exceeded.	Drawings and System Description listed above under References; 24590-WTP-DC-PS-01-001, Rev. 3, Pipe Stress Design Criteria including "Pipe Stress Criteria" and "Span Method Criteria"	The Pipe Stress Design Criteria document specifies use of ASME B31.3 as the design code for the WTP ancillary equipment. ASME B31.3 requires provision be made to safely contain or relieve any pressure to which the ancillary equipment may be subjected. The System Description provides a detailed discussion of the pressure control systems for the LAW melters and these offgas spools and bellows. The primary "important to safety" function for the offgas piping is to provide an intact primary confinement from the melters to the stack during normal operations, abnormal operations, and during and after a SC-III Design Level seismic event. This assures adequate pressure relief capability.

Information Assessed		Source of Information	Assessment
Strength	Maximum flows and any unusual operating stresses are identified	Drawings and System Description listed above under References; 24590-WTP-DC-PS-01-001, Rev. 3, Pipe Stress Design Criteria including "Pipe Stress Criteria" and "Span Method Criteria"; 24590-LAW-N1D-LOP-P0004, Rev. 0, Plant Item Material Selection Data Sheet, LOP Offgas Piping (downstream of film cooler to SBS entry)	The expected flow paths for the MTU Subsystem equipment are identified on the P&ID drawings. The Pipe Stress Design Criteria document specifies the ASME B31.3 code for piping design. This code requires piping to be designed to the highest pressure that can be developed in a piping system assuring that maximum operating stresses remain within code allowables. The System Description provides a general discussion of the operations of the melter offgas systems. The Plant Item Material Selection Data Sheet lists normal operating conditions and accident operating conditions for this MTU subsystem equipment as ranging from 2 in. Water Gage to 25 in. Water Gage below atmospheric pressure. Unusual operating stresses will not be a problem.
Secondary Containment	MTU Subsystem equipment is designed with secondary containment that is constructed of materials compatible with the waste and of sufficient strength to prevent failure (pressure gradients, waste, climatic conditions, daily operations), provided with a leak-detection system, and designed to drain and remove liquids.	Drawings and System Description listed above under References;	The MTU Subsystem equipment considered in this assessment is located in above grade melter and process cells. The equipment initiates at the melter film coolers in the Melter cell (Room L-0112) and extends to the SBS column vessel, housed within Room L-0123 for Melter 1 and Room L-0124 for Melter 2. Rooms L-0123 and L-0124 are provided with liners and sumps as appropriate, which outside of the scope of this integrity assessment.

COGEMA-IA-077, Rev. 0

R10437684

STRUCTURAL INTEGRITY ASSESSMENT OF THE LOW ACTIVITY WASTE (LAW) SECONDARY OFFGAS/VESSEL VENT PROCESS SYSTEM (LVP) ANCILLARY EQUIPMENT

Bechtel National, Inc

Job No 24590

SUPPLIER DOCUMENT STATUS

1. [X] **Work may proceed.**
2. [ ] **Revise and resubmit. Work may proceed subject to resolution of indicated comments.**
3. [ ] **Revise and resubmit. Work may not proceed.**
4. [ ] **Review not required. Work may proceed.**

Permission to proceed does not constitute acceptance or approval of design details, calculations, analyses, test methods, or materials developed or selected by the supplier and does not relieve supplier from full compliance with contractual obligations.

REVIEWED

G-321 Document Category N/A
[From Supplement A to G-321-E (E) or G-321-V (V), as applicable, or "N/A" if SSRS is used]

Supersedes BNI Document No. N/A Rev
[When applicable]

Accepted by DC Pflueger (Print Name) [signature] (Signature) 11/22/04 (Date)

Released by N/A (Print Name) (Signature) (Date)
[When applicable]

416 GP&S 7-03

Please note that source, special nuclear and byproduct materials, as defined in the Atomic Energy Act of 1954 (AEA), are regulated at the U.S. Department of Energy (DOE) facilities exclusively by DOE acting pursuant to its AEA authority. DOE asserts, that pursuant to the AEA, it has sole and exclusive responsibility and authority to regulate source, special nuclear, and byproduct materials at DOE-owned nuclear facilities. Information contained herein on radionuclides is provided for process description purposes only.

24590-CM-HC4-HXYG-00138-02-00052, REV. 00A

IQRPE REVIEW
OF
THE LOW ACTIVITY WASTE (LAW)
SECONDARY OFFGAS/VESSEL VENT PROCESS SYSTEM (LVP)
ANCILLARY EQUIPMENT

"I, Tarlok S. Hundal, have reviewed and certified a portion of the design of a new tank system or component located at the Hanford Waste Treatment Plant, owned/operated by Department of Energy, Office of River Protection, Richland, Washington. My duties were independent review of the current design for the Low Activity Waste (LAW) Secondary Offgas/Vessel Vent Process System (LVP) Ancillary Equipment, as required by the Washington Administrative Code, *Dangerous Waste Regulations,* Section WAC 173-303-640(3) (a) through (g) applicable components."

"I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment."

The documentation reviewed indicates that the design intent fully satisfies the requirements of the WAC.

The attached review is nine (9) pages numbered one (1) through nine (9).

EXPIRES: 02/19/06

T S Hundal

Signature

11-17-04

Date

Scope	Scope of this Integrity Assessment	This Integrity Assessment includes the LAW Vitrification Building LVP System ancillary equipment associated with the following plant items and components as shown on drawings 24590-LAW-M6-LVP-P0002 and –P0003: 1. Three RLD system vessels (RLD- VSL-00003/4/5) 2. Two LCP System Vessels (LCP-VSL-00001/2) 2. Four LFP system vessels (LFP-VSL-00001/2/3/4) 4. Manifold for Plant Wash & SBS Condensate Collection 5. One LVP system tank (LVP-TK-00001).
References	Drawing and System Descriptions	Drawings: 24590-LAW-P1-P01T-P0002, Rev. 3, LAW Vitrification Building General Arrangement Plan at EL. 3'-0"; 24590-LAW-M6-LVP-P0002, Rev. 1, P&ID LAW Secondary Offgas/Vessel Vent Process System and Stack Discharge Monitoring System (Q); 24590-LAW-M6-LVP-P0003, Rev. 0, P&ID LAW Secondary Offgas/Vessel Vent Process System Equipment Vents. 24590-LAW-M5-V17T-P0011, Rev. 0, Process Flow Diagram LAW Vit Secondary Offgas Treatment (System LVP); 24590-LAW-M6-LVP-00001, Rev. 1, P&ID LAW Secondary Offgas/Vessel Vent Process System Melters Secondary Offgas (Q); 24590-LAW-M6-DIW-00003, Rev. 2, P&ID LAW Demineralized Water System Drain Collection Manifolds. System Description: 24590-LAW-3YD-LOP-00001, Rev. 0, System Description for LOP and LVP: LAW Melter Offgas (including System Description Change Notice, SDCN No. 24590-LAW-3YN-LOP-00001, -00003, and -00004).
Summary of Assessment		For each item of "Information Assessed" (i.e., Criteria) on the following pages, the items listed under "Source of Information" were reviewed and found to furnish adequate design controls and requirements to ensure the design intent fully satisfies the requirements of Washington Administrative Code, WAC-173-303-640, *Dangerous Waste Regulations* for Tank Systems.

	Information Assessed	Source of Information	Discussion
Design	Ancillary equipment design standards are appropriate and adequate for the equipment's intended use.	Drawings listed above under References; 24590-WTP-DC-PS-01-001, Rev. 4, Pipe Stress Design Criteria including "Pipe Stress Criteria" and "Span Method Criteria"; ASME B31.3 Code, Process Piping, 1996 Edition, American Society of Mechanical Engineers; 24590-WTP-PSAR-ESH-01-002-03, Rev. 1, Preliminary Safety Analysis Report (PSAR) to Support Construction Authorization: LAW Facility Specific Information.	The Pipe Stress Design Criteria document identifies ASME B31.3 as the design code for piping systems for the WTP. The P& ID drawing identifies the Seismic Category (SC-III) and Non-Quality (CM) grade of all ancillary equipment components. To ensure continued function during normal operations, abnormal operations, and during and after a Design Basis Earthquake, the design requirements for SC-III components are discussed in detail in the Pipe Stress Design Criteria document. The Quality Levels are discussed in the PSAR. The above listed design criteria, codes, and standards are acceptable and adequate for the design of the ancillary equipment for its intended use.
	If the ancillary equipment to be used is not built to a design standard, the design calculations demonstrate sound engineering principles of construction.	ASME B31.3 Code, Process Piping, 1996 Edition, American Society of Mechanical Engineers; 24590-WTP-DC-PS-01-001, Rev. 4, Pipe Stress Design Criteria including "Pipe Stress Criteria" and "Span Method Criteria."	The ancillary equipment is built to design standards. The Pipe Stress Design Criteria document specifies that piping is to be designed in accordance with ASME B31.3 Code.

Information Assessed		Source of Information	Discussion
Design	Ancillary equipment has adequate strength at the end of its design life to withstand the operating pressure, operating temperature, thermal expansion, and seismic loads. Equipment is protected against physical damage and excessive stress due to settlement, vibration, expansion, or contraction.	24590-WTP-DC-PS-01-001, Rev. 4, Pipe Stress Design Criteria including "Pipe Stress Criteria" and "Span Method Criteria"; ASME B31.3 Code, Process Piping, 1996 Edition, American Society of Mechanical Engineers; ASME Boiler and Pressure Vessel Code, Section III, Rules for Construction of Nuclear Facility Components, Division 1, Subsection NC and Appendix F, 1995; 24590-WTP-DB-ENG-01-001, Rev. 1B, Basis of Design; 24590-WTP-PER-M-02-002, Rev. 1, Materials for Ancillary Equipment; DOE-STD-1020-94, Natural Phenomenon Hazards Design Evaluation Criteria for Department of Energy Facilities (including Change Notice #1, January 1996); UBC, Uniform Building Code, 1997 Edition.	The Basis of Design document specifies that the mechanical equipment is to be designed for a nominal plant life of 40 years. The Materials for Ancillary Equipment document specifies that ancillary equipment downstream of a waste source vessel or miscellaneous plant items is to be constructed of the same or better material and with the same corrosion allowance as the source vessel or plant items, unless the service seen in the downstream line warrants a different material, corrosion allowance, or other modification. The Pipe Stress Design Criteria requires the use of the ASME B31.3 Code and DOE-STD-1020-94 Standard, for piping design. ASME B31.3 requires explicit consideration of operating pressure, operating temperature, thermal expansion and contraction, settlement, vibration, and corrosion allowance in the design of piping. ASME BPV Code, Section III, Subsection NC and Appendix F, and the Uniform Building Code (UBC) are used to supplement the requirements of ASME B31.3 and DOE-STD-1020-94 for design as applicable to the appropriate Seismic Category of the ancillary equipment. Details of the seismic design methods are discussed in the Pipe Stress Design Criteria document. These are appropriate and adequate codes and standards to ensure that the ancillary equipment has adequate strength at the end of its design life to withstand all anticipated loads.

Information Assessed		Source of Information	Discussion
Supports	Ancillary equipment supports are adequately designed.	Drawings listed above under References; 24590-WTP-DC-PS-01-002, Rev. 3, Pipe Support Design Criteria; 24590-WTP-PER-PS-02-001, Rev. 4, Ancillary Equipment Pipe Support Design; ASME B31.3 Code, Process Piping, 1996 Edition, American Society of Mechanical Engineers; ASME Boiler and Pressure Vessel Code, Section III, Rules for Construction of Nuclear Facility Components, Division 1, Subsection NF and Appendix F, 1995; 24590-WTP-PL-PS-01-001, Rev. 1, Verification and Validation Test Plan for Bechtel's ME150 Pipe Support Family of Programs (PCFAPPS).	The Pipe Support Design Criteria considers all load types identified in ASME B31.3 and utilizes ASME Section III, Division 1, Subsection NF and Appendix F to supplement the requirements of ASME B31.3 for seismic design of SC-III/IV pipe supports. Bounding load cases are passed to the pipe support designers from the results of the ancillary equipment piping stress analyses. Details of the seismic design methodology are discussed in the Pipe Support Design Criteria document. Analysis is by manual calculation and computer programs that have been tested and approved as discussed in the Verification and Validation Test Plan for Bechtel's ME150 Pipe Support Family of Programs. The Ancillary Equipment Pipe Support Design document shows examples of typical equipment supports. Ancillary equipment supports are to be designed in such a way that the heat transferred from supports to the building structure does not raise the building structure temperature to exceed 150°F for concrete and 200°F for steel. These are appropriate codes and standards for design of the LVP system ancillary equipment supports.
Connections	Seams and connections are adequately designed.	24590-WTP-DB-ENG-01-001, Rev. 1B, Basis of Design; ASME B31.3 Code, Process Piping, 1996 Edition, American Society of Mechanical Engineers; 24590-WTP-DC-PS-01-001, Rev. 4, Pipe Stress Design Criteria including "Pipe Stress Criteria" and "Span Method Criteria"; ASME Boiler and Pressure Vessel Code, Section IX, Welding and Brazing Qualifications; ASME B16.5 Code, Piping Flanges and Flanged Fittings, 1988 Edition.	The Basis of Design states that in-cell piping that is non-maintainable will be fully welded. The Pipe Stress Design Criteria document specifies the ASME B31.3 Process Piping design code for the piping systems. Welding is to be performed in accordance with the requirements of ASME B31.3 and the ASME B&PV Code, Section IX. Flange connections are to be designed in accordance with ASME B16.5 Code. These are appropriate codes and standards for design and fabrication of the LVP system ancillary equipment seams and connections.

Information Assessed		Source of Information	Discussion
Frost Heave	The system will withstand the effects of frost heave.	Drawings and System Description listed above under References; 24590-WTP-DC-ST-01-001, Rev. 4, Structural Design Criteria.	Structural Design Criteria requires that all structural foundations for outdoor equipment shall extend into the surrounding soil below the 30" frost line depth to preclude the frost heave. The ancillary equipment associated with the LVP system considered in this assessment is located in the inside interior of the LAW Facility. The majority of the LAW building foundation mat is at Elev. (-) 21'-0" level, therefore, the ancillary equipment is not subject to frost heave.
Waste Characteristics	Characteristics of the waste to be stored or treated have been identified (ignitable, reactive, toxic, specific gravity, vapor pressure, flash point, temperature)	24590-WTP-PER-PR-03-001, Rev. 1, Prevention of Hydrogen Accumulation in WTP Tank Systems and Miscellaneous Treatment Unit Systems; 24590-WTP-PER-PR-03-002, Rev. 1, Toxic Vapors and Emissions from WTP Tank Systems and Miscellaneous Treatment Unit Systems	The Prevention of Hydrogen Accumulation in WTP Tank Systems and Miscellaneous Treatment Unit Systems document indicates that flammable or explosive concentrations of hydrogen are not expected in the LAW facility systems ancillary equipment. Similarly, the Toxic Vapors and Emissions from WTP Tank Systems and Miscellaneous Treatment Unit Systems document provides a summary of the LAW facility ancillary equipment design features that provide for confinement and treatment of chronically toxic vapors and emissions during normal operations, abnormal operations, and during and after a design level seismic event.

	Information Assessed	Source of Information	Discussion
Waste Characteristics	Ancillary equipment is designed to handle the wastes with the characteristics defined above and any treatment reagents.	Drawings and System Description listed above under References; 24590-WTP-PER-M-02-002, Rev. 1, Materials for Ancillary Equipment; 24590-WTP-PER-PL-02-001, Rev. 5, Piping Material Class Description.	The System Description identifies that various treatment reagents are added to the LVP system ancillary equipment during normal operations. The LVP system vessel offgas vent lines provide for collection of vessel offgases from selected vessels and provide pathways to the LVP header for treatment prior to release from the facility. The Materials for Ancillary Equipment document specifies that ancillary equipment downstream of a waste source vessel or miscellaneous plant items is to be constructed of the same or better material and with the same corrosion allowance as the source vessel or plant items, unless the service seen in the downstream line warrants a different material, corrosion allowance, or other modification. The secondary offgas vent lines and headers are to be fabricated from 316L stainless steel (Piping Class S11B) as shown in the P&ID diagram drawings and as identified in Piping Material Class Description document.

	Information Assessed	Source of Information	Discussion
Compatibility	The pH range of the waste, waste temperature and the corrosion behavior of the structural materials are adequately addressed. Ancillary equipment material and protective coatings ensure the ancillary equipment structure is adequately protected from the corrosive effects of the waste stream and external environments. The protection is sufficient to ensure the equipment will not leak or fail for the design life of the system.	System Description and listed above under References; 24590-WTP-DB-ENG-01-001, Rev.1B, Basis of Design; 24590-WTP-PER-M-02-002, Rev. 1, Materials for Ancillary Equipment; 24590-WTP-3PS-NN00-T0001, Rev 0, Engineering Specification for Hot and Anti-Sweat Thermal Insulation; Annual Book of ASTM Standards, American Society of Testing and Materials.	The Basis of Design identifies a service design life of 40 years for the ancillary equipment. All non-maintainable items will be designed to last the life of the facility. Detailed material selection (corrosion) analyses are conducted for each vessel and major components in the LVP system in the LAW facility during process design. The Materials for Ancillary Equipment document specifies that ancillary equipment downstream of a waste source vessel or miscellaneous plant items is to be constructed of the same or better material and with the same corrosion allowance as the source vessel or plant items, unless the service seen in the downstream line warrants a different material, corrosion allowance, or other modification. The Thermal Insulation specification requires that all insulating materials used on the outside of ancillary equipment be pre-approved for use on austenitic stainless steel in accordance with applicable ASTM procedures and tests to preclude external corrosion of ancillary equipment. Both internal and external corrosion has been considered for all ancillary equipment, therefore, the ancillary equipment will provide the expected design service life.

	Information Assessed	Source of Information	Discussion
Corrosion Allowance	Corrosion allowance is adequate for the intended service life of the ancillary equipment.	Drawings listed above under References; 24590-WTP-DC-PS-01-001, Rev. 4, Pipe Stress Design Criteria including "Pipe Stress Criteria" and "Span Method Criteria"; ASME B31.3 Code, Process Piping, 1996 Edition, American Society of Mechanical Engineers; 24590-WTP-DB-ENG-01-001, Rev. 1B, Basis of Design; 24590-WTP-PER-M-02-002, Rev. 1, Materials for Ancillary Equipment; 24590-WTP-PER-PL-02-001, Rev. 5, Piping Material Class Description.	The Pipe Stress Design Criteria document requires use of the ASME B31.3 Code for ancillary equipment design. Consideration of corrosion, including corrosion allowance, is a mandatory requirement of ASME B31.3. A required service design life of 40 years is identified in the Basis of Design for ancillary equipment located in inaccessible process cells. Detailed material selection (corrosion) analyses are conducted for each vessel and major components in the LVP system in the LAW Facility during process design. The Materials for Ancillary Equipment document specifies that ancillary equipment downstream of a waste source vessel or miscellaneous plant items is to be constructed of the same or better material and with the same corrosion allowance as the source vessel or plant items, unless the service seen in the downstream line warrants a different material, corrosion allowance, or other modification. Bounding corrosion allowances are listed for each piping material class in the Piping Material Class Description document. The corrosion/erosion allowance for the LVP system ancillary equipment is, 0.040 in. for the 316L stainless steel material. The material and corrosion allowance are appropriate and adequate for the intended service life of the ancillary equipment.
Strength	Pressure controls (vents and relief valves) are adequately designed to ensure pressure relief if normal operating pressures in the vessels are exceeded.	Drawings listed above under References; 24590-WTP-DC-PS-01-001, Rev. 4, Pipe Stress Design Criteria including "Pipe Stress Criteria" and "Span Method Criteria"; ASME B31.3 Code, Process Piping, 1996 Edition, American Society of Mechanical Engineers; 24590-WTP-PER-PL-02-001, Rev. 5, Piping Material Class Description.	The Pipe Stress Design Criteria document specifies use of ASME B31.3 as the design code for the WTP piping. ASME B31.3 requires provision be made to safely contain or relieve any pressure to which the piping may be subjected. ASME B31.3 piping not protected by a pressure relieving device, or that can be isolated from a pressure reliving device must be designed for at least the highest pressure that can be developed. Bounding pressure and temperature limits are listed for each of the piping material classes in the Piping Material Class Description document. These requirements are appropriate and adequate for the ancillary equipment design.

Information Assessed		Source of Information	Discussion
Strength	Maximum flows and any unusual operating stresses are identified	Drawings listed above under References; 24590-WTP-DC-PS-01-001, Rev. 4, Pipe Stress Design Criteria including "Pipe Stress Criteria" and "Span Method Criteria"; ASME B31.3 Code, Process Piping, 1996 Edition, American Society of Mechanical Engineers; 24590-WTP-PER-PL-02-001, Rev. 5, Piping Material Class Description.	The expected flow paths for the ancillary equipment are identified on the P&ID drawing. The Pipe Stress Design Criteria document specifies the ASME B31.3 Code for piping design. This code requires piping to be designed to the highest pressure that can be developed in a piping system, assuring that maximum operating stresses remain within the code allowable values. The Piping Material Class Description document lists the bounding pressure and temperature limits for each piping material class.
Secondary Containment	Ancillary equipment is designed with secondary containment that is constructed of materials compatible with the waste and of sufficient strength to prevent failure (pressure gradients, waste, climatic conditions, daily operations), provided with a leak-detection system, and designed to drain and remove liquids.	Drawings listed above under References; 24590-WTP-DB-ENG-01-001, Rev. 1B, Basis of Design.	The Basis of Design requires that "Tank system ancillary equipment that manages dangerous waste shall have secondary containment" and "All secondary containments will be provided with drains and leak detection systems for detection of primary containment leaks." The ancillary equipment considered in this assessment is located in process cells and process areas inside the LAW facility. Secondary containment for ancillary equipment within the cells and areas is provided by the liners, sumps, and drains within the cells, which are outside the scope of this integrity assessment.

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COGEMA-IA-079, Rev. 0

STRUCTURAL INTEGRITY ASSESSMENT OF THE LOW ACTIVITY WASTE FACILITY (LAW) SECONDARY OFFGAS/VESSEL VENT PROCESS SYSTEM (LVP) MISCELLANEOUS TREATMENT UNIT (MTU) SUBSYSTEMS ANCILLARY EQUIPMENT

Bechtel National, Inc

Job No. 24590

SUPPLIER DOCUMENT STATUS

1. [X] Work may proceed.
2. [ ] Revise and resubmit. Work may proceed subject to resolution of indicated comments.
3. [ ] Revise and resubmit. Work may not proceed.
4. [ ] Review not required. Work may proceed.

Permission to proceed does not constitute acceptance or approval of design details, calculations, analyses, test methods, or materials developed or selected by the supplier and does not relieve supplier from full compliance with contractual obligations.

REVIEWED

G-321 Document Category N/A
[From Supplement A to G-321-E (E) or G-321-V (V), as applicable, or "N/A" if SSRS is used]

Supersedes BNI Document No N/A Rev
[When applicable]

Accepted by DC Pflueger (Print Name) [signature] (Signature) 1/11/05 (Date)

Released by N/A (Print Name) (Signature) (Date)
[When applicable]

416 GP&S 7-03

Please note that source, special nuclear and byproduct materials, as defined in the Atomic Energy Act of 1954 (AEA), are regulated at the U.S. Department of Energy (DOE) facilities exclusively by DOE acting pursuant to its AEA authority. DOE asserts, that pursuant to the AEA, it has sole and exclusive responsibility and authority to regulate source, special nuclear, and byproduct materials at DOE-owned nuclear facilities. Information contained herein on radionuclides is provided for process description purposes only.

24590-CM-HC4-HXYG-00138-02-00053 Rev 00A

IQRPE REVIEW
OF
THE LOW ACTIVITY WASTE FACILITY (LAW) SECONDARY OFFGAS/VESSEL VENT PROCESS SYSTEM (LVP) MISCELLANEOUS TREATMENT UNIT (MTU) SUBSYSTEMS ANCILLARY EQUIPMENT

"I, Tarlok Hundal have reviewed, and certified a portion of the design of a new tank system or component located at the Hanford Waste Treatment Plant, owned/operated by Department of Energy, Office of River Protection, Richland, Washington. My duties were independent review of the current design for the Low Activity Waste Facility (LAW) Secondary Offgas/Vessel Vent Process System (LVP) Miscellaneous Treatment Unit (MTU) Subsystems Ancillary Equipment as required by the Washington Administrative Code, *Dangerous Waste Regulations*, Section WAC-173-303-640(3) (a) through (g) applicable components."

"I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment."

The documentation reviewed indicates that the design intent fully satisfies the requirements of the WAC.

The attached review is nine (9) pages numbered one (1) through nine (9).

TARLOK SINGH HUNDAL
STATE OF WASHINGTON
REGISTERED PROFESSIONAL ENGINEER

EXPIRES: 02/15/06

T S Hundal

Signature

1-7-05

Date

Scope	Scope of this Integrity Assessment	This Integrity Assessment includes the LAW LVP MTU Subsystems Ancillary Equipment associated with the following plant items and components as shown on drawings 24590-LAW-M6-LVP-P0001, -P0002, -P0004, and –P0005: • HEPA filters LVP-HEPA-00001A/B, LVP-HEPA-00002A/B, and LVP-HEPA-00003A with preheaters • Mercury adsorbers LVP-ADBR-00001A/B • Catalytic Oxidizer/Reducer Unit consisting of a heat recovery unit (LVP-HX-00001), an electric heater (LVP-HTR-00002), a volatile organic carbon (VOC) catalyst (LVP-SCO-00001), and selective catalytic reduction (SCR) catalyst (LVP-SCR-00001) • Caustic Scrubber (LVP-SCB-00001) • Exhausters LVP-EXHR-00001/A/B/C • Heaters LVP-HTR-00001A/B The LVP system begins where the LAW vessel vents and the LAW melter offgas flows merge and ends at the top of the stack where the offgas is discharged.
Summary of Assessment		For each item of "Information Assessed" (i.e., Criteria) on the following pages, the items listed under "Source of Information" were reviewed and found to furnish adequate design controls and requirements to ensure the design intent fully satisfies the requirements of Washington Administrative Code, WAC-173-303-640, *Dangerous Waste Regulations* for Tank Systems.

References	Drawings and System Description	Drawings: 24590-LAW-M6-LVP-P0001, Rev. 0, P&ID – LAW Secondary Offgas/Vessel Vent Process System Melters Secondary Offgas; 24590-LAW-M6-LVP-P0002, Rev. 2, P&ID – LAW Secondary Offgas/Vessel Vent Process System and Stack Discharge Monitoring System (Q); 24590-LAW-M6-LVP-P0003, Rev. 0, P&ID – LAW Secondary Offgas/Vessel Vent Process System Equipment Vents; 24590-LAW-M6-LVP-P0004, Rev. 0, P&ID - LAW Melters Secondary Offgas, Vessel Vent Process Systems Mercury Mitigation Equipment; 24590-LAW-M6-LVP-P0005, Rev. 0, P&ID – LAW Melters Secondary Offgas Vessel Vent Process System SCR, VOC, & Ammonia Dilution Packages; 24590-LAW-M5-V17T-P0010, Rev. 0, Process Flow Diagram LAW Vitrification Ammonia & Secondary Offgas (System AMR & LVP); 24590-LAW-M5-V17T-P0011, Rev. 0, Process Flow Diagram LAW Vit Secondary Offgas Treatment (System LVP); 24590-LAW-P1-P01T-P0004, Rev. 0, LAW Vitrification Building General Arrangement Plan at El. 28'-0". 24590-LAW-P1-P01T-00005, Rev. 1, LAW Vitrification Building General Arrangement Plan at El. 48'-0"; 24590-LAW-P1-P01T-P0007, Rev. 5, LAW Vitrification Building General Arrangement Section A-A, B-B, and C-C; 24590-LAW-P1-P01T-P0009, Rev. 5, LAW Vitrification Building General Arrangement Section G-G, H-H, and J-J; System Description: 24590-LAW-3YD-LOP-00001, Rev. 0, System Description for LOP and LVP: LAW Melter Offgas, including System Description Change Notice (SDCN) 24590-LAW-3YN-LOP-00001, -0003, and -0004.

Information Assessed		Source Document	Assessment
Design	Ancillary equipment design standards are appropriate and adequate for the equipment's intended use.	Drawings listed above under References; 24590-WTP-DC-PS-01-001, Rev. 4, Pipe Stress Design Criteria including "Pipe Stress Criteria" and "Span Method Criteria"; ASME B31.3, Process Piping, 1996 Edition, American Society of Mechanical Engineers; 24590-WTP-3DP-G04T-00905, Rev. 3, Determination of Quality Levels.	The Pipe Stress Design Criteria document identifies ASME B31.3 as the design code for piping systems for the WTP. P&ID drawings identify the Seismic Categories and Quality Levels of the MTU subsystem equipment considered in this assessment. The Pipe Stress Design Criteria document provides required seismic analysis methods and acceptance criteria for Seismic Categories (SC-I) through (SC-IV) to ensure continued function during normal operations, abnormal operations, and during and after a Design Basis Earthquake. The Determination of Quality Levels document defines the Quality Levels of the plant equipment. The above listed design criteria, codes, and standards are appropriate and adequate for the intended use of the LVP MTU subsystem equipment.
	If the ancillary equipment to be used is not built to a design standard, the design calculations demonstrate sound engineering principles of construction.	24590-WTP-DC-PS-01-001, Rev. 4, Pipe Stress Design Criteria including "Pipe Stress Criteria" and "Span Method Criteria"; ASME B31.3, Process Piping, 1996 Edition, American Society of Mechanical Engineers.	The LVP MTU subsystem equipment within the scope of this assessment is built to design standards. The Pipe Stress Design Criteria document specifies that piping is to be designed in accordance with ASME B31.3 Code.

Information Assessed		Source Document	Assessment
Design	Ancillary equipment has adequate strength at the end of its design life to withstand the operating pressure, operating temperature, thermal expansion, and seismic loads. Equipment is protected against physical damage and excessive stress due to settlement, vibration, expansion, or contraction.	24590-WTP-DB-ENG-01-001, Rev. 1B, Basis of Design; 24590-WTP-PER-M-02-002, Rev. 1, Materials for Ancillary Equipment; 24590-WTP-DC-PS-01-001, Rev 4, Pipe Stress Design Criteria including "Pipe Stress Criteria" and "Span Method Criteria"; ASME B31.3 Code, Process Piping, 1996 Edition, American Society of Mechanical Engineers; DOE-STD-1020-94, Natural Phenomenon Hazards Design Evaluation Criteria for Department of Energy Facilities (including Change Notice #1, January 1996); ASME Boiler and Pressure Vessel Code, Section III, Rules for Construction of Nuclear Facility Components, Division 1, Code Case N-411, Subsection NC, Appendix N, and Appendix F, 1995; UBC, Uniform Building Code, 1997 Edition.	The Basis of Design document specifies that WTP mechanical equipment is to be designed for a nominal plant life of 40 years. The Materials for Ancillary Equipment document specifies that ancillary equipment downstream of a waste source vessel or miscellaneous plant item is to be constructed of the same material as the vessel and with the same or greater corrosion allowance unless the service seen in the downstream line warrants a different material, corrosion allowance, or other modification. The Pipe Stress Design Criteria document requires the use of the ASME B31.3 Code and DOE-STD-1020-94 Standard for piping design. ASME B31.3 requires explicit consideration of operating pressure, operating temperature, thermal expansion and contraction, settlement, vibration, and corrosion allowance in the design of piping. ASME BPV Code, Section III, Subsection NC, Appendix N, Appendix F, and Code Case N-411, and the Uniform Building Code (UBC) are used to supplement the requirements of ASME B31.3 and DOE-STD-1020-94 for design as applicable to the appropriate Seismic Category of the ancillary equipment. Details of the seismic analysis methods and acceptance criteria are specified in the Pipe Stress Design Criteria document. These are appropriate and adequate codes and standards to ensure that the LVP MTU subsystem equipment included in this assessment has adequate strength at the end of its design life to withstand all anticipated loads.

Information Assessed		Source Document	Assessment
Supports	Ancillary equipment supports are adequately designed.	Drawings listed above under References; 24590-WTP-DC-PS-01-002, Rev. 2, Pipe Support Design Criteria; ASME B31.3 Code, Process Piping, 1996 Edition, American Society of Mechanical Engineers; MSS-SP-58, Manufacturers Standardization Society Standard Practice 58, Pipe Hangers and Supports – Materials, Design, and Manufacture; ASME Boiler and Pressure Vessel Code, Section III, Rules for Construction of Nuclear Facility Components, Division 1, Subsection NF and Appendix F, 1995; 24590-WTP-PL-PS-01-001, Rev. 1, Verification and Validation Test Plan for Bechtel's ME150 Pipe Support Family of Programs (PCFAPPS); 24590-WTP-PER-PS-02-001, Rev. 4, Ancillary Equipment Pipe Support Design.	P&IDs drawings identify the seismic categories of LVP MTU subsystem equipment within the scope of this assessment. The Pipe Support Design Criteria document categorizes pipe supports based upon the piping seismic classification. This document then specifies ASME B31.3, including MSS-SP-58, for supports for piping categories SC-I/II. For categories SC-III/IV, ASMI B31.3 is supplemented by ASME Section III, Division 1, Subsection NF and Appendix F. Bounding load cases are passed to the pipe support designers from the results of piping stress analyses. Details of the seismic design methodology and allowable limits are given in the Pipe Support Design Criteria document. Analysis is by manual calculation and computer programs that have been tested and approved as discussed in the Verification and Validation Test Plan for Bechtel's ME150 Pipe Support Family of Programs. The Ancillary Equipment Pipe Support Design document shows examples of typical equipment supports. Ancillary equipment supports are to be designed in such a way that the heat transferred from supports to the building structure does not raise the building structure temperature to exceed 150°F for concrete and 200°F for steel. These are appropriate codes and standards for design of the LVP MTU subsystem equipment supports.

Information Assessed		Source Document	Assessment
Connections	Seams and connections are adequately designed.	24590-WTP-DC-PS-01-001, Rev. 4, Pipe Stress Design Criteria including "Pipe Stress Criteria" and "Span Method Criteria"; ASME B31.3 Code, Process Piping, 1996 Edition, American Society of Mechanical Engineers; ASME Boiler and Pressure Vessel Code, Section IX, Welding and Brazing Qualifications ASME/ANSI B16.5, 1988 Edition, Piping Flanges and Flanged Fittings.	The piping systems addressed in this assessment contain both welded and flanged connections. The Pipe Stress Design Criteria document specifies the ASME B31.3 Process Piping design code for all WTP piping systems. Welded seams and connections are designed and welded in accordance with ASME B31.3 and welded in accordance with the ASME B&PV Code, Section IX. Flange connections are to be designed in accordance with ANSI B16.5. These are appropriate and adequate codes and standards for design and fabrication of seams and connections associated with the LVP MTU subsystem equipment assessed herein.
Frost Heave	The system will withstand the effects of frost heave.	General Arrangement Drawings and System Description listed above under References; 24590-WTP-DC-ST-01-001, Rev. 4, Structural Design Criteria.	The LVP MTU subsystem equipment considered in this assessment is located in process cells inside the LAW Facility as shown in the General Arrangement drawings listed under References. The Structural Design Criteria document requires that all structural foundations shall extend into the surrounding soil below the frost line to preclude frost heave. The frost line is 30 in. below grade. The LAW building foundation mat in the areas of the facility containing the assessed equipment is at the (-) 21'- 0" elevation. Therefore, the LVP MTU equipment located inside the building is not subject to frost heave.
Waste Characteristics	Characteristics of the waste to be stored or treated have been identified (ignitable, reactive, toxic, specific gravity, vapor pressure, flash point, temperature)	System Description listed above under References.	The function of the LVP MTU subsystem equipment is the transfer of waste between LAW Secondary Offgas miscellaneous treatment units. The characteristics of the waste handled by the equipment addressed in this assessment will be the same as that handled by the MTUs. The identification of waste characteristics for the MTUs is addressed in separate integrity assessments. The System Description listed under References provides a summary of design criteria required to mitigate identified hazards associated with the MTUs.

Information Assessed		Source Document	Assessment
Waste Characteristics	Ancillary equipment is designed to handle the wastes with the characteristics defined above and any treatment reagents.	Drawings and System Description listed above under References; 24590-WTP-PER-M-02-002, Rev. 1, Materials for Ancillary Equipment; 24590-WTP-PER-PL-02-001, Rev. 5, Piping Material Class Description.	The Materials for Ancillary Equipment document requires that the material selection and corrosion/erosion allowances for ancillary equipment in contact with the waste will be equal to or better than the material and corrosion allowance of the waste source vessels (MTUs) unless the service seen in the downstream line warrants a different material, corrosion allowance, or other modifications. Piping material classes for the LVP MTU subsystem are identified on the P&IDs drawings listed under References. Required materials for identified piping material classes are shown in the Piping Material Class Description document. Treatment reagents are added to the LVP system; ammonia to the Catalytic Oxidizer Unit and 5M sodium hydroxide to the Caustic Collection Tank.
Compatibility	The pH range of the waste, waste temperature and the corrosion behavior of the structural materials are adequately addressed. Ancillary equipment material and protective coatings ensure the ancillary equipment structure is adequately protected from the corrosive effects of the waste stream and external environments. The protection is sufficient to ensure the equipment will not leak or fail for the design life of the system.	24590-WTP-DB-ENG-01-001, Rev.1B, Basis of Design; 24590-WTP-PER-M-02-002, Rev. 1, Materials for Ancillary Equipment; 24590-WTP-3PS-NN00-T0001, Rev 0, Engineering Specification for Hot and Anti-Sweat Thermal Insulation; Annual Book of ASTM Standards, American Society of Testing and Materials.	The Basis of Design identifies a service design life of 40 years for WTP mechanical equipment. Detailed material selection (corrosion) analyses are conducted for each vessel and major component, including MTUs, in the LAW LVP system during process design. The Materials for Ancillary Equipment document requires that the material selection and corrosion/erosion allowances for ancillary equipment in contact with the waste will be equal to or better than the material and corrosion allowance of the waste source vessels (MTUs) except as noted therein. The Thermal Insulation specification requires that insulating materials used on austenitic stainless steel be qualified in accordance with applicable ASTM procedures and tests to preclude external corrosion of ancillary equipment. Both internal and external corrosion have been adequately addressed and the assessed equipment will provide the expected design service life.

Information Assessed		Source Document	Assessment
Corrosion Allowance	Corrosion allowance is adequate for the intended service life of the ancillary equipment.	Drawings listed above under References; 24590-WTP-DC-PS-01-001, Rev. 4, Pipe Stress Design Criteria including "Pipe Stress Criteria" and "Span Method Criteria"; ASME B31.3 Code, Process Piping, 1996 Edition, American Society of Mechanical Engineers; 24590-WTP-DB-ENG-01-001, Rev. 1B, Basis of Design; 24590-WTP-PER-M-02-002, Rev. 1, Materials for Ancillary Equipment; 24590-WTP-PER-PL-02-001, Rev. 5, Piping Material Class Description.	The Pipe Stress Design Criteria document requires use of the ASME B31.3 Code for ancillary equipment design. Consideration of corrosion, including corrosion allowance, is a mandatory requirement of ASME B31.3. A required service design life of 40 years for WTP equipment is identified in the Basis of Design document. Detailed material selection (corrosion) analyses are conducted for each vessel and major component, including MTUs, in the LVP system in the LAW Facility during process design. The Materials for Ancillary Equipment document requires that downstream ancillary equipment is to be constructed of equal material and with the same or greater corrosion allowance as the source vessel (MTU) except as noted therein. Piping material classes are shown on the P&ID drawings. Bounding corrosion allowances are listed for each piping material class in the Piping Material Class Description document. The corrosion/erosion allowance for the 316L stainless steel and N08367 stainless steel used in the LVP MTU subsystem equipment is 0.040 in. and 0.0425 in. respectively. The material and corrosion allowance are appropriate and adequate for the intended service life of the MTU subsystem equipment.
Strength	Pressure controls (vents and relief valves) are adequately designed to ensure pressure relief if normal operating pressures in the vessels are exceeded.	Drawings listed above under References; 24590-WTP-DC-PS-01-001, Rev. 4, Pipe Stress Design Criteria including "Pipe Stress Criteria" and "Span Method Criteria"; ASME B31.3 Code, Process Piping, 1996 Edition, American Society of Mechanical Engineers; 24590-WTP-PER-PL-02-001, Rev. 5, Piping Material Class Description.	The Pipe Stress Design Criteria document specifies use of ASME B31.3 as the design code for WTP piping. ASME B31.3 requires provision be made to safely contain or relieve any pressure to which the piping may be subjected. ASME B31.3 piping not protected by a pressure relieving device, or that can be isolated from a pressure relieving device must be designed for at least the highest pressure that can be developed. Piping material classes are shown on the P&ID drawings. Bounding pressure and temperature limits are listed for each of the piping material classes in the Piping Material Class Description document.

	Information Assessed	Source Document	Assessment
Strength	Maximum flows and any unusual operating stresses are identified	Drawings and System Description listed above under References.	The expected flow paths for the LVP MTU subsystem equipment are identified on the P&ID drawings listed under References. Per the System Description document, the maximum air flow is that which maintains the required vacuum in the offgas header. This airflow is provided by the LVP exhausters, LVP-EXHR-00001A/B/C, which are automatically adjusted to maintain a constant vacuum depending upon the number of melters online and the number of melters being fed. The vacuum will be monitored at the offgas header where the LAW melter primary offgas lines and the vessel vent line join. There are no unusual operating stresses associated with the LVP MTU subsystem equipment.
Secondary Containment	Ancillary equipment is designed with secondary containment that is constructed of materials compatible with the waste and of sufficient strength to prevent failure (pressure gradients, waste, climatic conditions, daily operations), provided with a leak-detection system, and designed to drain and remove liquids.	Drawings and System Description listed above under References.	The LVP MTU subsystem equipment considered in this assessment is located in process rooms within the LAW facility. Secondary containment within these areas is provided by the facility and is outside the scope of this integrity assessment.

JAN 07 2005

AREVA

COGEMA-05-0006

Ms. D. J. Whiting
Bechtel National, Inc.
Waste Treatment Plant
2435 Stevens Center Place
Richland, Washington 99352

January 7, 2005

Dear Ms. Whiting:

BECHTEL NATIONAL, INC. CONTRACT NO. 24590-CM-HC4-HXYG-00138 - STRUCTURAL INTEGRITY ASSESSMENT LOW ACTIVITY WASTE FACILITY (LAW) SECONDARY OFFGAS/VESSEL VENT PROCESS SYSTEM (LVP) MISCELLANEOUS TREATMENT UNIT (MTU) SUBSYSTEMS ANCILLARY EQUIPMENT

The integrity assessment of the subject ancillary equipment has been completed per the contract requirements and is enclosed for your use. The assessment found the design intent is sufficient to ensure that the ancillary equipment will be adequately designed and will have sufficient structural strength, compatibility with the waste(s) to be processed/stored/treated, and corrosion protection to ensure that they will not collapse, rupture, or fail.

If you have any questions, please contact Tarlok Hundal at (509) 373-4438, or via facsimile at (509) 372-0504.

E. A. Nelson

E. A. Nelson, Director
Engineering & Technology
COGEMA Engineering Corporation

kld

Attachment

cc: D. C. Pfluger MS4-E2 w/ attachment

2425 Stevens Center Place, Second Floor, P.O. Box 840, Richland, Washington 99352
Tel: (509) 372-8256 - Fax: (509) 372-3169

COGEMA ENGINEERING CORPORATION

Bechtel National, Inc.

Job No. 24590

SUPPLIER DOCUMENT STATUS

1. [X] **Work may proceed.**
2. [ ] **Revise and resubmit. Work may proceed subject to resolution of indicated comments.**
3. [ ] **Revise and resubmit. Work may not proceed.**
4. [ ] **Review not required. Work may proceed.**

Permission to proceed does not constitute acceptance or approval of design details, calculations, analyses, test methods, or materials developed or selected by the supplier and does not relieve supplier from full compliance with contractual obligations.

REVIEWED									E&NS AMZ

G-321 Document Category N/A
[From Supplement A to G-321-E (E) or G-321-V (V), as applicable, or "N/A" if SSRS is used]

Supersedes BNI Document No. N/A Rev.
[When applicable]

Accepted by DC Pfluger (Print Name) DC Pfluger (Signature) 12/4/03 (Date)

Released by (Print Name) (Signature) (Date)
[When applicable]

416 GP&S 7-03

24590-CM-HC4-HXYG-00138-02-07
REV. 00A

SUBCONTRACT SUBMITTAL

R10173474

IQRPE REVIEW
Of
LOW ACTIVITY WASTE (LAW) VITRIFICATION FACILITY
RADIOACTIVE LIQUID WASTE DISPOSAL SYSTEM (RLD) VESSELS
(RLD-VSL-00003 and RLD-VSL-00005)

"I, Tarlok S. Hundal, have reviewed and certified a portion of the design of a new tank system or component located at the Hanford Waste Treatment Plant, owned/operated by Department of Energy, Office of River Protection, Richland, Washington. My duties were independent review of the current design for the Low Activity Waste (LAW), Radioactive Liquid Waste Disposal System (RLD) Vessels (Plant Wash Vessel, RLD-VSL-00003 and SBS Condensate Vessel, RLD-VSL-00005) as required by The Dangerous Waste Regulations, namely, WAC 173-303-640(3) applicable paragraphs [i.e., (a) through (g)]."

"I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment."

The documentation reviewed indicate that the design intent fully satisfies the requirements of the WAC.

The attached review is six (6) pages numbered one (1) through six (6) for Vessel, RLD-VSL-00003 and seven (7) pages numbered one (1) through seven (7) for Vessel, RLD-VSL-00005.

TARLOK SINGH HUNDAL
STATE OF WASHINGTON
20213
REGISTERED
PROFESSIONAL ENGINEER
EXPIRES: 02/15/04

TSHundal

Signature

12/02/03

Date

Best Available Copy

24590-CM-HC4-HXYG-00138-02-07, Rev. 00A

STRUCTURAL INTEGRITY ASSESSMENT OF LOW ACTIVITY WASTE (LAW) VITRIFICATION FACILITY RADIOACTIVE LIQUID WASTE DISPOSAL SYSTEM (RLD) VESSELS (RLD-VSL-00003 and RLD-VSL-00005)

COGEMA-IA-026, Rev. 0

Scope	Scope of this Integrity Assessment	This integrity assessment includes: One RLD Plant Wash Vessel: RLD-VSL-00003 including its appurtenances or offspring items, located in cell L-0126 at Elevation 3'-0" in the LAW Vitrification Building.
References	Specifications, Drawings and Mechanical Data Sheets	The following Specifications are listed in Material Requisition No. 24590-CM-MRB-MVA0-00001, Rev. 1 Engineering Specification for Pressure Vessel Design and Fabrication; Engineering Specification for Seismic Qualification Criteria for Pressure Vessels; Specification for Welding of Pressure Vessels, Heat Exchangers and Boilers; General Specification for Supplier Quality Assurance Program Requirements; Specification for Positive Material Identification (PMI); General Specification for Packing, Shipping, Handling, and Storage; Engineering Specification for Seismic Qualification Criteria for Pressure Vessels; Engineering Specification for Structural Design Loads for Seismic Category III and IV Equipment and Tanks. Drawings: 24590-LAW-MV-RLD-P0002, Rev. 1, Equipment Assembly Plant Wash Vessel, (RLD-VSL-00003); 24590-LAW-M6-RLD-P0001, Rev. 1, P & ID-LAW Radioactive Liquid Waste Disposal System Plant Wash & SBS Condensate Collection; 24590-LAW-P1-P01T-P0002, Rev. 2, LAW Vitrification Building General Arrangement Plan at El. 3'-0"; 24590-LAW-P1-P01T-P0007, Rev. 3, LAW Vitrification Building General Arrangement Section C-C; 24590-LAW-P1-P01T-P0010, Rev. 3, LAW Vitrification Building General Arrangement Section K-K and L-L; 24590-LAW-M5-V17T-P0014, Rev. 1, Process Flow Diagram LAW Liquid Effluent (System RLD & NLD). Mechanical Data Sheet: 24590-LAW-MVD-RLD-P0007, Rev.2, Plant Wash Vessel (RLD-VSL-00003).
Summary of Assessment		For each item of "Information Assessed" (i.e., Criteria) on the following pages, the items listed under "Source of Information" were reviewed and found to furnish adequate design controls and requirements to ensure the design intent fully satisfies the requirements of Washington Administrative Code, WAC-173-303-640, *Dangerous Waste Regulations*.

	Information Assessed	Source of Information	Assessment
Design	Vessel design standards are appropriate and adequate for the vessel's intended use.	Specifications listed under Material Requisition, Drawings, and Mechanical Data Sheet listed above under References; 24590-LAW-3YD-20-00001, Rev. 0, System Description for LAW Virtification Liquid Effluent Systems (RLD and NLD); SDCN No. 24590-LAW-3YN-20-00001, System Description for LAW Virtification Liquid Effluent Systems (RLD and NLD).	The RLD system Plant Wash Vessel, RLD-VSL-00003 vessel and all appurtenances are to be designed to the ASME Section VIII, Division 1 rules which are appropriate for pressure vessels operating with mixed waste solutions over the pressure and temperature ranges specified for this vessel. Supplementary requirements are specified in the Engineering Specification for Pressure Vessel Design and Fabrication. Supplementary requirements address pressure vessel fatigue analysis, positive material identification, lifting attachment design, equipment drop evaluation, fabrication tolerances, acceptable welding procedures for the vessel and appurtenances, welder qualifications and testing records, NDE inspections and records, and lifting, packaging, shipping, handling and storage requirements. These are adequate and acceptable design standards. The LAW Plant Wash Vessel, RLD-VSL-00003 is a vertical vessel with a 192 in. ID and a height of 185 in. from bottom tangent line to top of its head. It is supported on a cylindrical skirt (1" thick by approx. 3'-0" high) which in turn is supported on a base plate anchored to the concrete floor at Elev. 3'-0". The vessel top head is flat, built with 2.5" thick plate and the bottom is a Flanged & Dished (F & D) head with minimum thickness of 3/4". The shell is specified to be made of 3/4" thick plate. The vessel has internal equipment such as an agitator, pump, thermocouples etc. supported from the tank top or from top and bottom or both. Material for the shell, bottom head and the vessel's internal equipment is UNS N08367 (6% Molybdenum stainless steel alloy, grade AL6XN), and will hereafter be referred to as 6% Mo. The SA-240 316L stainless steel (0.030% maximum carbon content, dual certified) is specified for the top head and sprayers. The supporting skirt is specified as SA-240 304L stainless steel (0.030% maximum carbon content, dual certified). Both preceding listed stainless steel materials will hereafter be referred to as 316L and 304L, respectively. The operating volume is to be about 23,400 gallons and the total internal volume is to be about 25,800 gallons.

	Information Assessed	Source of Information	Assessment
Design	If a non-standard vessel is to be used, the design calculations demonstrate sound engineering principles of construction.	Specifications listed under Material Requisition, Drawings, and Mechanical Data Sheet listed above under References; 24590-CM-MRB-MVA0-00001-S02, Rev.0, Material Requisition Supplement.	The RLD Plant Wash Vessel, RLD-VSL-00003 is a standard ASME Section VIII vessel. The Mechanical Data Sheet requires that the ASME Section VIII, Division 1 vessels be delivered after design, fabrication, inspection and testing with an ASME code stamp and that the vessels be nationally registered. Supplemental design information is provided by the reference documents listed in the Source of Information column for utilizing sound engineering principles of construction of the vessels. As discussed above, the vessel design standards are appropriate and adequate for the vessel's intended use.
	Vessel has adequate strength, after consideration of the corrosion allowance, to withstand the operating pressure, operating temperature, and seismic loads.	Specifications listed under Material Requisition, Drawings, and Mechanical Data Sheet listed above under References; 24590-LAW-3YD-20-00001, Rev. 0, System Description for LAW Vitrification Liquid Effluent Systems (RLD and NLD).	The Mechanical Data Sheet identifies the vessel's operating pressure and temperature ranges, the materials selected for the vessel, the corrosion allowance(s), and the vessel quality level which determines the requirements for seismic design. The design specification for the vessel requires specific consideration of the operating pressures and temperatures and seismic loads in the design process. ASME Section VIII, Div. 1 requires that corrosion allowance thickness shall be excluded from nominal vessel thickness when evaluating the adequacy of vessel components for these loads at end of life. The Engineering Specification for Seismic Qualification Criteria for Pressure Vessels adopts ASME Section VIII, Div. 2 design rules to address seismic design and analysis of the vessel and ASME Section VIII, Div. 1 for vessel supports. Detailed requirements for seismic load determination are furnished in the specification for Seismic Category III/IV Equipment and Tanks. These codes and standards are adequate and appropriate for design of the RLD vessel to withstand operating pressure and temperature loads and seismic loads for the specified design life.

	Information Assessed	Source of Information	Assessment
Foundation	Vessel foundation will maintain the load of a full vessel.	Specifications listed under Material Requisition above under References; 24590-WTP-DB-ENG-01-001, Rev. 1, Basis of Design.	The Engineering Specification for Pressure Vessel Design and Fabrication requires the use of ASME B&PV Code, Section VIII, Division 1 for design of the vessel supports. This code ensures an adequate design for the vessel supports. Chapter 14 of the Basis of Design document requires that vessel foundations design must be adequate to support the loads from full vessels.
	If in an area subject to flooding, the vessel is anchored.	Specifications listed under Material Requisition under References.	Buoyant forces of an empty vessel in a flooded room are a mandatory standard design load case in the Specification for Pressure Vessel Design and Fabrication.
	Vessel system will withstand the effects of frost heave.	24590-WTP-DB-ENG-01-001, Rev. 1, Basis of Design.	The Basis of Design document requires that all structural foundations extend a distance below grade that exceeds the depth of the frost line. The vessel is located inside/interior of the building at above grade (Elevation 3'-0" level), therefore, the vessel foundation is not subject to frost heave.

	Information Assessed	Source of Information	Assessment
Waste Characteristics	Characteristics of the waste to be stored or treated have been identified (ignitable, reactive, toxic, specific gravity, vapor pressure, flash point, storage temperature)	Mechanical Data Sheet listed above under References; Plant Item Material Selection Data Sheet, 24590-LAW-N1D-RLD-P0005, Rev. 0, RLD-VSL-00003 (LAW) Plant Wash Vessel; 24590-WTP-PSAR-ESH-01-002-03, Rev. 0a, Preliminary Safety Analysis Report: LAW Facility Specific Information; 24590-WTP-DWPA-ENV-01-001, Rev. 1, WTP Dangerous Waste Permit Application.	The Mechanical Data Sheet presents the waste specific gravity, storage temperatures and pressures. The Plant Item Material Selection Data Sheet addresses the pH range and chemical composition of the waste to select appropriate vessel materials and specify the corrosion allowance. Other waste characteristics that are hazardous, such as ignitability, reactivity, and toxicity are addressed by the Preliminary Safety Analysis Report for the LAW Vitrification Building and in Part A of the Permit Application as an integral part of the design process. The RLD vessels provide primary confinement of the waste during normal operations, abnormal operations and during and after a Design Basis Earthquake. The vessel has a continually operating agitator to mitigate any sludge buildup and the vessel is actively vented via the LAW vent system to prevent any build-up of flammable gases. The vessel is grounded to control ignition sources.
	Vessel is designed to store or treat the wastes with the characteristics defined above and any treatment reagents.	Plant Item Material Selection Data Sheet, 24590-LAW-N1D-RLD-P0005, Rev. 0, RLD-VSL-00003 (LAW) Plant Wash Vessel; 24590-LAW-3YD-20-00001, Rev. 0, System Description for LAW Vitrification Liquid Effluent Systems (RLD and NLD).	The Plant Item Material Selection Data Sheet demonstrates that the vessel is designed to process the wastes discussed above. The System Description discusses normal and abnormal operations for the RLD vessels. Compatible chemicals may be added to the vessels to maintain sodium molarity of 5M. Acid or water will be used for flushing/rinsing.
	The waste types are compatible with each other.	24590-LAW-3YD-20-00001, Rev. 0, System Description for LAW Virtification Liquid Effluent Systems (RLD and NLD).	The System Description for the LAW (RLD) does not describe any operations where incompatible wastes are mixed in these vessels for processing. The RLD vessels function primarily to collect/store secondary effluent waste from various LAW facility systems, mix, and then transfer it to the Pretreatment facility for further processing.

	Information Assessed	Source of Information	Assessment
Corrosion Protection	Vessel material and protective coatings ensure the vessel structure is adequately protected from the corrosive effects of the waste stream and external environments (expected to not leak or fail for the design life of the system)	Drawings and Mechanical Data Sheet listed above under References; Plant Item Material Selection Data Sheet; 24590-LAW-N1D-RLD-P0005, Rev. 0, RLD-VSL-00003 (LAW) Plant Wash Vessel; 24590-LAW-3YD-20-00001, Rev. 0, System Description for LAW Vitrification Liquid Effluent Systems (RLD and NLD).	The Plant Item Material Selection Data Sheet shows that the LAW Plant Wash Vessel, RLD-VSL-00003 normally operates at atmospheric pressure, pH 3 to 14.7, and at 68 °F temperature. The vessel is designed for 15 psig pressure and 200 °F maximum temperature. Potential acid cleaning operations of the vessel were also considered. The materials selected are 6 % Mo and 316L and a corrosion allowance of 0.04 in. The RLD vessel is located in the LAW effluent cell (L-0126) at elevation 3'-0". The vessel's support skirt material is 304L. This cell is equipped with sump to pump out any leaks. Therefore, the cell should remain dry during normal operations which will limit external corrosion of the vessel over the facility design life. The RLD vessel receives waste from various LAW facility systems, drains, and sumps, which includes vessel wash liquid, condensate, and effluent. This vessel's effluent is sent to Pretreatment Facility's Plant Wash Vessel (PWD-VSL-00044) for further processing.
Corrosion Allowance	Corrosion allowance is adequate for the intended service life of the vessel.	Mechanical Data Sheet listed above under References; Plant Item Material Selection Data Sheet; 24590-LAW-N1D-RLD-P0005, Rev. 0, RLD-VSL-00003 (LAW) Plant Wash Vessel.	The bases for the RLD vessel's material selection and corrosion allowance are furnished in the Plant Item Material Selection Data Sheet. Selection of 6% Mo, 316L, and 304L materials with a corrosion allowance of 0.04 in. for a service life of 40 years is adequate and appropriate. The material selections and corrosion allowances are carried forward to the Mechanical Data Sheet consistently and correctly.
Pressure Relief	Pressure controls (vents and relief valves) are adequately designed to ensure pressure relief if normal operating pressures in the vessel are exceeded.	Drawings listed above under References; 24590-LAW-3YD-20-00001, Rev. 0, System Description for LAW Vitrification Liquid Effluent Systems (RLD and NLD).	The RLD Plant Wash Vessel, RLD-VSL-00003 is designed to unrestricted overflow through 6" diameter line to the C3/C5 Drains/Sump Collection Vessel (RLD-VSL-00004) located at Elevation (-) 21'-0", as shown on the drawings and described in the System Description document. The vessel is also connected to the LAW vessel vent system to prevent over pressurization of the vessel.

Scope	Scope of this Integrity Assessment	This integrity assessment includes: One RLD SBS Condensate Collection Vessel: RLD-VSL-00005 including its appurtenances or offspring items, located in cell L-0126 at Elevation 3'-0" in the LAW Vitrification Building.
References	Specifications, Drawings and Mechanical Data Sheets	The following Specifications are listed in Material Requisition No. 24590-QL-MRB-MVA0-00001, Rev. 3 Engineering Specification for Pressure Vessel Design and Fabrication; Engineering Specification for Seismic Qualification Criteria for Pressure Vessels; Specification for Welding of Pressure Vessels, Heat Exchangers and Boilers; General Specification for Supplier Quality Assurance Program Requirements; Specification for Positive Material Identification (PMI); General Specification for Packing, Shipping, Handling, and Storage; Engineering Specification for Seismic Qualification Criteria for Pressure Vessels; Engineering Specification for Structural Design Loads for Seismic Category III and IV Equipment and Tanks. Drawings: 24590-LAW-MV-RLD-P0003, Rev. 1, Equipment Assembly SBS Condensate Collection Vessel, (RLD-VSL-00005); 24590-LAW-M6-RLD-P0001, Rev. 1, P & ID-LAW Radioactive Liquid Waste Disposal System Plant Wash & SBS Condensate Collection; 24590-LAW-P1-P01T-P0002, Rev. 2, LAW Vitrification Building General Arrangement Plan at El. 3'-0"; 24590-LAW-P1-P01T-P0007, Rev. 3, LAW Vitrification Building General Arrangement Section C-C; 24590-LAW-P1-P01T-P0010, Rev. 3, LAW Vitrification Building General Arrangement Section K-K and L-L; 24590-LAW-M5-V17T-P0014, Rev. 1, Process Flow Diagram LAW Liquid Effluent (System RLD & NLD). Mechanical Data Sheet: 24590-LAW-MVD-RLD-P0006, Rev.1, SBS Condensate Collection Vessel (RLD-VSL-00005).
Summary of Assessment		For each item of "Information Assessed" (i.e., Criteria) on the following pages, the items listed under "Source of Information" were reviewed and found to furnish adequate design controls and requirements to ensure the design intent fully satisfies the requirements of Washington Administrative Code, WAC-173-303-640, *Dangerous Waste Regulations*.

	Information Assessed	Source of Information	Assessment
Design	Vessel design standards are appropriate and adequate for the vessel's intended use.	Specifications listed under Material Requisition, Drawings, and Mechanical Data Sheet listed above under References; 24590-LAW-3YD-20-00001, Rev. 0, System Description for LAW Virtification Liquid Effluent Systems (RLD and NLD); SDCN No. 24590-LAW-3YN-20-00001, System Description for LAW Virtification Liquid Effluent Systems (RLD and NLD).	The RLD system SBS Condensate Collection Vessel, RLD-VSL-00005 vessel and all appurtenances are to be designed to the ASME Section VIII, Division 1 rules which are appropriate for pressure vessels operating with mixed waste solutions over the pressure and temperature ranges specified for this vessel. Supplementary requirements are specified in the Engineering Specification for Pressure Vessel Design and Fabrication. Supplementary requirements address pressure vessel fatigue analysis, positive material identification, lifting attachment design, equipment drop evaluation, fabrication tolerances, acceptable welding procedures for the vessel and appurtenances, welder qualifications and testing records, NDE inspections and records, and lifting, packaging, shipping, handling and storage requirements. These are adequate and acceptable design standards. The LAW SBS Condensate Collection Vessel, RLD-VSL-00005 is a vertical vessel with a 192 in. ID and a height of 185 in. from bottom tangent line to top of its head. It is supported on a cylindrical skirt (3/8" thick by approx. 3'-0" high) which in turn is supported on a base plate anchored to the concrete floor at Elev. 3'-0". The vessel head is flat, built with 2.75" thick plate and the bottom is Flanged & Dished (F & D) head with minimum thickness of 3/4". The shell is specified to be made of 3/4" thick plate. The vessel has internal equipment such as an agitator, pump, thermocouples etc. supported from the tank top or from top and bottom or both. Material for the shell, bottom head and the vessel's internal equipment is UNS N08367 (6% Molybdenum stainless steel alloy, grade AL6XN), will hereafter be referred to as 6% Mo. The SA-240 316L stainless steel (0.030% maximum carbon content, dual certified) is specified for the top head and sprayers. The supporting skirt is specified as SA-240 304L stainless steel (0.030% maximum carbon content, dual certified). Both preceding listed stainless steel materials will hereafter be referred to as 316L and 304L, respectively. The operating volume is to be about 23,400 gallons and the total internal volume is to be about 25,800 gallons.

	Information Assessed	Source of Information	Assessment
Design	If a non-standard vessel is to be used, the design calculations demonstrate sound engineering principles of construction.	Specifications listed under Material Requisition, Drawings, and Mechanical Data Sheet listed above under References; 24590-QL-MRB-MVA0-00001-S01, Rev.003, Material Requisition Supplement; 24590-QL-MRB-MVA0-00001-S02, Rev.003, Material Requisition Supplement; 24590-QL-MRB-MVA0-00001-S03, Rev.003, Material Requisition Supplement; 24590-QL-MRB-MVA0-00001-S04, Rev.003, Material Requisition Supplement. 24590-QL-MRB-MVA0-00001-S05, Rev.003, Material Requisition Supplement.	The RLD SBS Condensate Collection Vessel, RLD-VSL-00005 is a standard ASME Section VIII vessel. The Mechanical Data Sheet requires that the ASME Section VIII, Division 1 vessels be delivered after design, fabrication, inspection and testing with an ASME code stamp and that the vessels be nationally registered. Supplemental design information is provided by the reference documents listed in the Source of Information column for utilizing sound engineering principles of construction of the vessels. As discussed above, the vessel design standards are appropriate and adequate for the vessel's intended use.

	Information Assessed	Source of Information	Assessment
Design	Vessel has adequate strength, after consideration of the corrosion allowance, to withstand the operating pressure, operating temperature, and seismic loads.	Specifications listed under Material Requisition, Drawings, and Mechanical Data Sheet listed above under References; 24590-LAW-3YD-20-00001, Rev. 0, System Description for LAW Vitrification Liquid Effluent Systems (RLD and NLD).	The Mechanical Data Sheet identifies the vessel's operating pressure and temperature ranges, the materials selected for the vessel, the corrosion allowance(s), and the vessel quality level which determines the requirements for seismic design. The design specification for the vessels require specific consideration of the operating pressures and temperatures and seismic loads in the design process. ASME Section VIII, Div. 1 requires that corrosion allowance thickness shall be excluded from nominal vessel thickness when evaluating the adequacy of vessel components for these loads at end of life. The Engineering Specification for Seismic Qualification Criteria for Pressure Vessels adopts ASME Section VIII, Div. 2 design rules to address seismic design and analysis of the vessel and ASME Section VIII, Division 1 for vessel supports. Detailed requirements for seismic load determination are furnished in the specification for Seismic Category III/IV Equipment and Tanks. These codes and standards are adequate and appropriate for design of the RLD vessel to withstand operating pressure and temperature loads and seismic loads for the specified design life.

	Information Assessed	Source of Information	Assessment
Foundation	Vessel foundation will maintain the load of a full vessel.	Specifications listed under Material Requisition above under References; 24590-WTP-DB-ENG-01-001, Rev. 1, Basis of Design.	The Engineering Specification for Pressure Vessel Design and Fabrication requires the use of ASME B&PV Code, Section VIII, Division 1 for design of the vessel supports. This code ensures an adequate design for the vessel supports. Chapter 14 of the Basis of Design document requires that vessel foundations design must be adequate to support the loads from full vessels.
Foundation	If in an area subject to flooding, the vessel is anchored.	Specifications listed under Material Requisition above under References.	Buoyant forces of an empty vessel in a flooded room are a mandatory standard design load case in the Specification for Pressure Vessel Design and Fabrication.
Foundation	Vessel system will withstand the effects of frost heave.	24590-WTP-DB-ENG-01-001, Rev. 1, Basis of Design.	The Basis of Design document requires that all structural foundations extend a distance below grade that exceeds the depth of the frost line. The vessel is located inside/interior of the building at above grade (Elevation 3'-0" level), therefore, the vessel foundation is not subject to frost heave.
Waste Characteristics	Characteristics of the waste to be stored or treated have been identified (ignitable, reactive, toxic, specific gravity, vapor pressure, flash point, storage temperature)	Mechanical Data Sheet listed above under References; Plant Item Material Selection Data Sheet, 24590-LAW-N1D-RLD-P0002, Rev. 0, RLD-VSL-00005 (LAW) SBS Condensate Collection Vessel; 24590-WTP-PSAR-ESH-01-002-03, Rev. 0a, Preliminary Safety Analysis Report: LAW Facility Specific Information; 24590-WTP-DWPA-ENV-01-001, Rev. 1, WTP Dangerous Waste Permit Application.	The Mechanical Data Sheet presents the waste specific gravity, storage temperatures and pressures. The Plant Item Material Selection Data Sheet addresses the pH range and chemical composition of the waste to select appropriate vessel materials and specify the corrosion allowance. Other waste characteristics that are hazardous, such as ignitability, reactivity, and toxicity are addressed by the Preliminary Safety Analysis Report for the LAW Vitrification Building and in Part A of the Permit Application as an integral part of the design process. The RLD vessels provide primary confinement of the waste during normal operations, abnormal operations and during and after a Design Basis Earthquake. The vessel has a continually operating agitator to mitigate any sludge buildup and the vessel is actively vented via the LAW vent system to prevent any build-up of flammable gases. The vessel is grounded to control ignition sources.

	Information Assessed	Source of Information	Assessment
	Vessel is designed to store or treat the wastes with the characteristics defined above and any treatment reagents.	Plant Item Material Selection Data Sheet, 24590-LAW-N1D-RLD-P0002, Rev. 0, RLD-VSL-00005 (LAW) SBS Condensate Collection Vessel; 24590-LAW-3YD-20-00001, Rev. 0, System Description for LAW Vitrification Liquid Effluent Systems (RLD and NLD).	The Plant Item Material Selection Data Sheet demonstrates that the vessel is designed to process the wastes discussed above. The System Description discusses normal and abnormal operations for the RLD vessels. Compatible chemicals may be added to the vessels to maintain sodium molarity of 5M. Acid or water will be used for flushing/rinsing.
	The waste types are compatible with each other.	24590-LAW-3YD-20-00001, Rev. 0, System Description for LAW Virtification Liquid Effluent Systems (RLD and NLD).	The System Description for the LAW (RLD) does not describe any operations where incompatible wastes are mixed in these vessels for processing. The RLD vessels function primarily to collect/store secondary effluent waste from various LAW facility systems, mix, and then transfer it to the Pretreatment facility for further processing.
Corrosion Protection	Vessel material and protective coatings ensure the vessel structure is adequately protected from the corrosive effects of the waste stream and external environments (expected to not leak or fail for the design life of the system)	Drawings and Mechanical Data Sheet listed above under References; Plant Item Material Selection Data Sheet; 24590-LAW-N1D-RLD-P0002, Rev. 0, RLD-VSL-00005 (LAW) SBS Condensate Collection Vessel; 24590-LAW-3YD-20-00001, Rev. 0, System Description for LAW Vitrification Liquid Effluent Systems (RLD and NLD).	The Plant Item Material Selection Data Sheet shows that the LAW SBS Condensate Collection Vessel, RLD-VSL-00005 normally operates at atmospheric pressure, pH 1 to 7.83, and at 104 °F temperature. The vessel is designed for 15 psig pressure and 200 °F maximum temperature. Potential acid cleaning operations of the vessel were also considered. The materials selected are 6 % Mo and 316L and a corrosion allowance of 0.04 in. The RLD vessel is located in the LAW effluent cell (L-0126) at elevation 3'-0". The vessel's support skirt material is 304L. This cell is equipped with sump to pump out any leaks. Therefore, the cell should remain dry during normal operations which will limit external corrosion of the vessel over the facility design life. The RLD vessel receives condensate from various LAW facility systems for short term storage and transfers it to the LAW SBS Condensate Receipt Vessels (TLP-VSL-00009A/B) for further processing.
Corrosion Allowance	Corrosion allowance is adequate for the intended service life of the vessel.	Mechanical Data Sheet listed above under References; Plant Item Material Selection Data Sheet; 24590-LAW-N1D-RLD-P0002, Rev. 0, RLD-VSL-00005 (LAW) SBS Condensate Collection Vessel;	The bases for the RLD vessel's material selection and corrosion allowance are furnished in the Plant Item Material Selection Data Sheet. Selection of 6% Mo, 316L, and 304L materials with a corrosion allowance of 0.04 in. for a service life of 40 years is adequate and appropriate. The material selections and corrosion allowances are carried forward to the Mechanical Data Sheet consistently and correctly.

	Information Assessed	Source of Information	Assessment
Pressure Relief	Pressure controls (vents and relief valves) are adequately designed to ensure pressure relief if normal operating pressures in the vessel are exceeded.	Drawings listed above under References; 24590-LAW-3YD-20-00001, Rev. 0, System Description for LAW Vitrification Liquid Effluent Systems (RLD and NLD).	The RLD SBS Condensate Collection Vessel, RLD-VSL-00005 is designed to unrestricted overflow through 6" diameter line to the RLD Plant Wash Vessel (RLD-VSL-00003) co-located in the same cell (L-0126) at Elevation 3'-0", as shown on the drawings and described in the System Description document. The vessel is also connected to the LAW vessel vent system to prevent over pressurization of the vessel.

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BY PDC

AREVA-07-074

Ms. Anne Weldon
Subcontracts
Bechtel National, Inc.
2435 Stevens Center Place
Richland, Washington 99354

July 31, 2007

Dear Ms. Weldon:

BECHTEL NATIONAL, INC. CONTRACT NO. 24590-CM-HC4-HXYG-00211 - STRUCTURAL INTEGRITY ASSESSMENT OF THE LOW ACTIVITY WASTE (LAW) MELTER FEED PROCESS (LFP) SYSTEM MELTER FEED PREP VESSELS (LFP-VSL-00001/3) AND MELTER FEED VESSELS (LFP-VSL-00002/4) (AREVA-IA-100, REV. 0)

The integrity assessment has been completed per the contract requirements and is enclosed for your use. The assessment found that the design is sufficient to ensure that the vessels are adequately designed and will have sufficient structural strength, compatibility with the waste(s) to be processed/stored/treated, and corrosion protection to ensure that they will not collapse, rupture, or fail.

If you have any questions, please feel free to contact Ruben Mendoza at (509) 372-2684.

Sincerely,

M. D. Rickenbach

M. D. Rickenbach, Director
Engineering & Services
AREVA NC Inc.
Richland

llm

Enclosure

cc: D. C. Pfluger MS 5-L w/enclosure (2)

AREVA NC INC.

2425 Stevens Center Place, Second Floor, Richland, Washington 99354 - PO Box 840, Richland, Washington 99352
Tel.: 509 372 8256 - Fax: 509 372 3169 - www.areva.com

STRUCTURAL INTEGRITY ASSESSMENT FOR LOW ACTIVITY WASTE (LAW) MELTER FEED PROCESS (LFP) SYSTEM MELTER FEED PREP VESSELS (LFP-VSL-00001/3) AND MELTER FEED VESSELS (LFP-VSL-00002/4)

Please note that source, special nuclear and byproduct materials, as defined in the Atomic Energy Act of 1954 (AEA), are regulated at the U.S. Department of Energy (DOE) facilities exclusively by DOE acting pursuant to its AEA authority. DOE asserts, that pursuant to the AEA, it has sole and exclusive responsibility and authority to regulate source, special nuclear, and byproduct materials at DOE-owned nuclear facilities. Information contained herein on radionuclides is provided for process description purposes only.

IQRPE REVIEW
FOR
LOW ACTIVITY WASTE (LAW) MELTER FEED PROCESS (LFP) SYSTEM MELTER FEED PREP VESSELS (LFP-VSL-00001/3) AND MELTER FEED VESSELS (LFP-VSL-00002/4)

"I, Ruben E. Mendoza, have reviewed, and certified a portion of the design of a new tank system or component located at the Hanford Waste Treatment Plant, owned/operated by Department of Energy, Office of River Protection, Richland, Washington. My duties were independent review of the current design for the Low-Activity Waste (LAW) Facility Melter Feed Process (LFP) System Melter Feed Prep Vessels (LFP-VSL-00001/3) and Melter Feed Vessels (LFP-VSL-00002/4) as required by the Washington Administrative Code, *Dangerous Waste Regulations*, Section WAC-173-303-640(3) (a) through (g) applicable components."

"I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment."

The documentation reviewed indicates that the design fully satisfies the requirements of the WAC.

The attached review is nine (9) pages numbered one (1) through nine (9).

Signature

7-31-07
Date

Scope	Scope of this Integrity Assessment	This integrity assessment includes the following LFP system vessels and their appurtenances, located in cells L-0123/L-0124 respectively, at Elevation 2'-0" in the LAW Vitrification Building: 1. Two LFP Melter Feed Prep Vessels (LFP-VSL-00001/3), 2. Two LFP Melter Feed Vessels (LFP-VSL-00002/4).
References	Material Requisition, Specifications, and System Description	Material Requisition (MR): 24590-CM-MRA-MVA0-00002, Rev. 2 (including Supplement Nos. S0013, S0014, and S0015 to Rev. 2), Pressure Vessels, Stainless Steel, Shop Fabricated, Medium (N026)(MS005). Specifications: The following Specifications with their respective revision and Specification Change Notices (SCNs) are listed in the above listed Material Requisition: 24590-WTP-3PS-MV00-T0001, Engineering Specification for Pressure Vessel Design and Fabrication; 24590-WTP-3PS-MVB2-T0001, Engineering Specification for Welding of Pressure Vessels, Heat Exchangers and Boilers; 24590-WTP-3PS-G000-T0001, General Specification for Supplier Quality Assurance Program Requirements; 24590-WTP-3PS-G000-T0002, Engineering Specification for Positive Material Identification (PMI); 24590-WTP-3PS-G000-T0003, Engineering Specification for Packaging, Handling, and Storage Requirements; 24590-WTP-3PS-MV00-T0002, Engineering Specification for Seismic Qualification Criteria for Pressure Vessels; 24590-WTP-3PS-MV00-T0003, Engineering Specification for Pressure Vessel Fatigue analysis; 24590-WTP-3PS-FB01-T0001, Engineering Specification for Structural Design Loads for Seismic Category III and IV Equipment and Tanks. System Description: 24590-LAW-3YD-LFP-00001, Rev. 1, System Description for LAW Melter Feed Process (LFP) System.
Summary of Assessment		For each item of "Information Assessed" (i.e., Criteria) on the following pages, the items listed under "Source of Information" were reviewed and found to furnish adequate design controls and requirements to ensure the design fully satisfies the requirements of Washington Administrative Code, WAC-173-303-640, *Dangerous Waste Regulations*.

References (cont'd)	Mechanical Data Sheets, Facility and Vendor Fabrication Drawings	Mechanical Data Sheets: 24590-LAW-MVD-LFP-00010, Rev. 3, Melter 1 Feed Prep Vessel (LFP-VSL-00001); 24590-LAW-MVD-LFP-00011, Rev. 3, Melter 2 Feed Prep Vessel (LFP-VSL-00003); 24590-LAW-MVD-LFP-00007, Rev. 3 Melter 1 Feed Vessel (LFP-VSL-00002); 24590-LAW-MVD-LFP-00008, Rev. 3 Melter 2 Feed Vessel (LFP-VSL-00004). Facility Drawings: 24590-LAW-P1-P01T-00001, Rev. 2, LAW Vitrification Building General Arrangement Plan at El (-)21'-0"; 24590-LAW-P1-P01T-00002, Rev. 5, LAW Vitrification Building General Arrangement Plan at El. 3'-0"; 24590-LAW-M5-V17T-00001, Rev. 5, Process Flow Diagram LAW Concentrate Receipt & Melter 1 Feed (System LCP, GFR, and LFP); 24590-LAW-M5-V17T-00002, Rev. 5, Process Flow Diagram LAW Concentrate Receipt & Melter 2 Feed (System LCP, GFR, and LFP); 24590-LAW-M6-LFP-00001, Rev. 4, P & ID-LAW Melter Feed Process System Melter 1 Feed Preparation and Feed; 24590-LAW-M6-LFP-00003, Rev. 4, P & ID-LAW Melter Feed Process System Melter 2 Feed Preparation and Feed. Vendor Fabrication Drawings (* Bechtel Code 1, 2, or 4 Drawings): 24590-CM-POA-MVA0-00002-03-22, Rev. 00F, General Arrangement Vessel LFP-VSL-00001 - Melter 1 Feed Prep VSL; 24590-CM-POA-MVA0-00002-03-23, Rev. 00G, Plan View Vessel LFP-VSL-00001 - Melter 1 Feed Prep VSL; 24590-CM-POA-MVA0-00002-03-04, Rev. 00F, General Arrangement Vessel LFP-VSL-00002 - Melter 1 Feed Vessel; 24590-CM-POA-MVA0-00002-03-01, Rev. 00I, Plan View Vessel LFP-VSL-00002 - Melter 1 Feed Vessel; 24590-CM-POA-MVA0-00002-03-11, Rev. 00F, General Arrangement Vessel LFP-VSL-00003 – Melter 2 Feed Prep VSL; 24590-CM-POA-MVA0-00002-03-12, Rev. 00G, Plan View Vessel LFP-VSL-00003 Melter 2 Feed Prep VSL; 24590-CM-POA-MVA0-00002-03-42, Rev. 00E, General Arrangement Vessel LFP-VSL-00004 – Melter 2 Feed Vessel; 24590-CM-POA-MVA0-00002-03-43, Rev. 00H, Plan View Vessel LFP-VSL-00004 Melter 2 Feed Vessel. * Bechtel Code 1 Drawing is an "as fabricated vendor drawing" approved/accepted by Bechtel. Bechtel Code 2 Drawing is an "as fabricated vendor drawing" approved (with comments)/accepted by Bechtel. Bechtel Code 4 Drawing is an "as fabricated vendor drawing" approved/accepted by Bechtel without review.

Information Assessed		Source of Information	Assessment
Design	Vessel design standards are appropriate and adequate for the vessel's intended use.	Specifications, Drawings, Mechanical Data Sheets, listed above under References; ASME Boiler and Pressure Vessel Code (BPV), Section VIII, Division 1, Rules for Construction of Pressure Vessels, American Society of Mechanical Engineers; UBC 1997, Uniform Building Code, International Conference of Building Officials; AISC Manual of Steel Construction, Allowable Stress Design, American Institute of Steel Construction.	The LAW Melter Feed Process (LFP) system includes two melter feed prep vessels (MFPV) [LFP-VSL-00001/3] and two melter feed vessels (MFV) [LFP-VSL-00002/4]. LAW concentrate will be transferred from the concentrate receipt vessels to the MFPVs where glass formers are added and mixed. The resulting batch of melter feed will be transferred from the MFPV to a MFV, then to a melter. The LFP vessels, LFP-VSL-00001/2/3/4 are identical vertical vessels. The drawings show that each vessel has a 132 in. ID and a height of 126 in. from bottom tangent line to top tangent line. The vessel's top and bottom Flanged & Dished (torispherical) heads are built with 1" thick plate (top head) and 3/4" thick plate (bottom head). The shell is made of 3/4" thick plate. Each vessel is supported on a cylindrical skirt (1/2" thick by approx. 2'-6" high) which is supported on a base plate anchored to the concrete floor at Elev. 2'-0". The vessels have internal equipment such as an agitator, pumps, and spray nozzles that are supported from the vessel's top. Material for the shell, top, and bottom heads is SA-240 316 stainless steel (with max. 0.030% carbon content, dual certified) and is hereafter referred to as 316 SS. The supporting skirt is specified as SA-240 304 stainless steel and is hereafter referred to as 304 SS. The total internal volume is to be approximately 9,120 gallons with an operating volume of approximately 7,690 gallons. The Mechanical Data Sheets identify the LFP components as seismic category SC-III and a quality level of Commercial Material. The LFP system vessels are designed to the ASME Section VIII, Division 1 rules (with UBC-97 implemented for seismic loads on the vessels) and the vessel supports are designed to ASME Section VIII, Division 1 and the AISC manual. Supplementary requirements are identified in the Engineering Specifications and include positive material identification, seismic load requirements, welding requirements, fabrication tolerances, NDE inspections and records, quality assurance requirements, and packaging, handling and storage requirements. These are appropriate and adequate design codes and standards for pressure vessels operating over the pressure and temperature ranges specified for these vessels.

Information Assessed		Source of Information	Assessment
Design (cont'd)	If a non-standard vessel is to be used, the design calculations demonstrate sound engineering principles of construction.	Mechanical Data Sheets, Material Requisition, and Drawings listed above under References; ASME Boiler and Pressure Vessel Code (BPV), Section VIII, Division 1, Rules for Construction of Pressure Vessels, American Society of Mechanical Engineers; 24590-CM-POA-MVA0-00002-02-03, Rev. 00F, Design Calculations for LFP-VSL-00001 and LFP-VSL-00003; 24590-CM-POA-MVA0-00002-02-01, Rev. 00E, Design Calculations for LFP-VSL-00002 and LFP-VSL-00004.	The LFP system vessels, LFP-VSL-00001/2/3/4 are standard ASME Section VIII vessels. The Mechanical Data Sheets require that the ASME Section VIII, Division 1 vessels be delivered after design, fabrication, inspection and testing with an ASME code stamp and that the vessels be nationally registered. Review of the Design Calculations and fabrication drawings show that the vessels have been designed as standard vessels per applicable requirements of the ASME Section VIII, Div. 1 code and additional requirements documents listed in the Material Requisition for the vessels demonstrating that sound engineering principles of construction and fabrication have been implemented for the vessels.

Information Assessed		Source of Information	Assessment
Design (cont'd)	Vessel has adequate strength, after consideration of the corrosion allowance, to withstand the operating pressure, operating temperature, and seismic loads.	Specifications, Material Requisition, Drawings, and Mechanical Data Sheets listed above under References; ASME Boiler and Pressure Vessel Code (BPV), Section VIII, Division 1, Rules for Construction of Pressure Vessels, American Society of Mechanical Engineers; ASME Boiler and Pressure Vessel Code (BPV), Section VIII, Division 2, Rules for Construction of Pressure Vessels – Alternative Rules, American Society of Mechanical Engineers; UBC 1997, Uniform Building Code, International Conference of Building Officials; 24590-CM-POA-MVA0-00002-02-03, Rev. 00F, Design Calculations for LFP-VSL-00001 and LFP-VSL-00003; 24590-CM-POA-MVA0-00002-02-01, Rev. 00E, Design Calculations for LFP-VSL-00002 and LFP-VSL-00004.	The Mechanical Data Sheets identify the vessel operating pressure and temperature ranges, the materials selected for the vessels, the corrosion/erosion allowances, the vessels' quality level and seismic category, and design requirements. The design specification for the vessels and ASME Section VIII, Div. 1 requires specific consideration of the operating pressures and temperatures and seismic loads in the design process and also requires that the corrosion/erosion allowance thickness be excluded from nominal vessel thickness when evaluating the adequacy of vessel components for these loads through the end of life. The Engineering Specification for Seismic Qualification Criteria for Pressure Vessels adopts ASME Section VIII, Div. 1 as the governing design code to address seismic design and analysis of the vessels with acceptance criteria in accordance with ASME Section VIII, Div. 2. Detailed requirements for seismic load determination are furnished in the Specification for Structural Design Loads for Seismic Category III & IV Equipment and Tanks. This specification specifies that the UBC 1997 code be used for seismic load determination for SC-III components. Design Calculations were reviewed and found to appropriately incorporate requirements of ASME Section VIII, Div.1/Div.2 and the design specifications. Calculations use the correct vessel material properties and include multiple configurations and load combinations for the vessels including maximum vessel temperatures and pressures, empty/full vessel, new/corroded walls, and seismic loads. The calculations correctly incorporate the materials, dimensions, corrosion allowances, and configurations identified in the engineering design requirements documents. Calculation results show that the vessels, nozzles, and welds have adequate strength after the appropriate consideration of corrosion/erosion allowance to withstand the applicable loads. Additionally, approval and acceptance of the vendor calculations and fabrication drawings by Bechtel National Inc. (BNI) is an added assurance that all applicable requirements pertaining to the design of the vessels have been met.

Information Assessed		Source of Information	Assessment
Foundation	Vessel foundation will maintain the load of a full vessel.	Specifications and drawings listed above under References; ASME Boiler and Pressure Vessel Code (BPV), Section VIII, Division 1, Rules for Construction of Pressure Vessels, American Society of Mechanical Engineers; AISC Manual of Steel Construction, Allowable Stress Design, American Institute of Steel Construction; 24590-WTP-DB-ENG-01-001, Rev. 1I, Basis of Design; 24590-CM-POA-MVA0-00002-02-03, Rev. 00F, Design Calculations for LFP-VSL-00001 and LFP-VSL-00003; 24590-CM-POA-MVA0-00002-02-01, Rev. 00E, Design Calculations for LFP-VSL-00002 and LFP-VSL-00004.	The Engineering Specification for Pressure Vessel Design and Fabrication requires the use of ASME Section VIII, Division 1 and the AISC manual for design of the vessel supports. These codes ensure an adequate design for the vessel supports. Design Calculations include the vessel skirt, base plate, and anchor bolts. These calculations were reviewed and found to appropriately evaluate the support system of the vessels incorporating the requirements of ASME Section VIII, Div.1 and the design specification documents including vessel support materials, fluid specific gravity, new/corroded vessel weights and seismic loading. The calculations correctly incorporate the dimensions and configurations identified in the vessel fabrication drawings. Calculation results show acceptable stresses on the tank supports. The Basis of Design document requires that the foundation underlying the vessel support must be adequate to support the loads from the full vessel however the adequacy of the underlying foundation is not part of this integrity assessment. The foundation adequacy is part of a separate integrity assessment report for the Secondary Containment of the LFP vessels.
	If in an area subject to flooding, the vessel is anchored.	Specifications and Mechanical Data Sheets listed above under References.	The Specification of Pressure Vessel Design and Fabrication requires supports and anchors to secure the buoyant vessel in case the vessel is empty and submerged to the level indicated in the Mechanical Data Sheets. The Mechanical Data Sheets for these vessels do not indicate any such conditions; therefore, the flooding consideration does not apply.
	Vessel system will withstand the effects of frost heave.	24590-WTP-DB-ENG-01-001, Rev. 1I, Basis of Design.	The Basis of Design document requires that all structural foundations extend a distance below grade that exceeds the 30" depth of the frost line. The vessels are located inside/interior of the building at above grade (Elevation 2'-0" level) and the building's lower level floor is at Elevation (-)21'-0", therefore, the vessel system is not subject to frost heave.

Information Assessed		Source of Information	Assessment
Waste Characteristics	Characteristics of the waste to be stored or treated have been identified (ignitable, reactive, toxic, specific gravity, vapor pressure, flash point, storage temperature)	Mechanical Data Sheets listed above under References; 24590-LAW-N1D-LFP-00004, Rev. 2, Corrosion Evaluation LFP-VSL-00001/3 Melter 1 & 2 Feed Preparation Vessels; 24590-LAW-N1D-LFP-00006, Rev. 0, Corrosion Evaluation LFP-VSL-00002/4 Melter 1 & 2 Feed Vessels; 24590-WTP-PER-PR-03-001, Rev. 1, Prevention of Hydrogen Accumulation in WTP Tank Systems and Miscellaneous Treatment Unit Systems; 24590-WTP-PER-PR-03-002, Rev. 2, Toxic Vapors and Emissions from WTP Tank Systems and Miscellaneous Treatment Unit Systems.	The Mechanical Data Sheets identify the waste process conditions and design parameters of the vessels including the waste specific gravity, storage temperatures and pressures. The Corrosion Evaluation documents address the pH range and chemical composition of the waste to select appropriate vessel materials and specify the corrosion/erosion allowances. Waste characteristics that are hazardous, such as ignitability, reactivity and toxicity are appropriately addressed in the Toxic Vapors and Emissions document and Prevention of Hydrogen Accumulation document. These two documents do not specifically list these vessels to exhibit any hazardous characteristics.
	Vessel is designed to store or treat the wastes with the characteristics defined above and any treatment reagents.	System Description listed above under References; 24590-LAW-N1D-LFP-00004, Rev. 2, Corrosion Evaluation LFP-VSL-00001/3 Melter 1 & 2 Feed Preparation Vessels; 24590-LAW-N1D-LFP-00006, Rev. 0, Corrosion Evaluation LFP-VSL-00002/4 Melter 1 & 2 Feed Vessels.	The Corrosion Evaluations demonstrate that the vessels are designed to process the wastes as discussed above. The System Description discusses normal and abnormal operations for the LFP vessels. Compatible fluid (demineralized water) will be used for flushing/rinsing or wash downs of the vessels. The 316 SS material selected for the vessels is appropriate for the waste to be stored and the rinsing fluid.
	The waste types are compatible with each other.	System Description listed above under References.	The System Description for the LAW Melter Feed Process (LFP) does not describe any operations where incompatible wastes are mixed in these vessels for processing. The LFP vessels function primarily to receive LAW concentrate waste from the concentrate receipt vessels to mix with glass formers prior to transfer to the melters. No other wastes are used in these vessels.

Information Assessed		Source of Information	Assessment
Corrosion Protection	Vessel material and protective coatings ensure the vessel structure is adequately protected from the corrosive effects of the waste stream and external environments (expected to not leak or fail for the design life of the system)	Drawings and Mechanical Data Sheets listed above under References; 24590-LAW-N1D-LFP-00004, Rev. 2, Corrosion Evaluation LFP-VSL-00001/3 Melter 1 & 2 Feed Preparation Vessels; 24590-LAW-N1D-LFP-00006, Rev. 0, Corrosion Evaluation LFP-VSL-00002/4 Melter 1 & 2 Feed Vessels.	The Corrosion Evaluations and Mechanical Data Sheets show that the LFP Melter Feed Prep vessels (LFP-VSL-00001/3) and Feed Vessels (LFP-VSL-00002/4) normally operate at a pH of 13.9 to 14.7 with an operating temperature of 98 °F and an operating pressure of 0.07 psig. The vessels are designed for a maximum temperature of 150°F and a maximum pressure of 15 psig. The material selection corrosion considerations include the effects of general corrosion, pitting corrosion, stress corrosion cracking, galvanic corrosion, and erosion. The material selected for the vessels is 316 SS with a corrosion/erosion allowance of 0.04 in. for the upper head and 0.125 in. for the bottom head and shell which is adequate and appropriate for the waste to be stored. The material for the vessel support is 304 SS. The drawings show that the LFP vessels are located in LAW cells L-0123 and L-0124 at Elevation 2'-0". These cells are equipped with a sump to pump out any leaked fluid. Therefore, the cells should remain dry during normal operations which will limit external corrosion of the vessels and their supports over the facility design life of 40 years.
Corrosion Allowance	Corrosion allowance is adequate for the intended service life of the vessel.	Mechanical Data Sheets listed above under References; 24590-LAW-N1D-LFP-00004, Rev. 2, Corrosion Evaluation LFP-VSL-00001/3 Melter 1 & 2 Feed Preparation Vessels; 24590-LAW-N1D-LFP-00006, Rev. 0, Corrosion Evaluation LFP-VSL-00002/4 Melter 1 & 2 Feed Vessels; 24590-CM-POA-MVA0-00002-02-03, Rev. 00F, Design Calculations for LFP-VSL-00001 and LFP-VSL-00003; 24590-CM-POA-MVA0-00002-02-01, Rev. 00E, Design Calculations for LFP-VSL-00002 and LFP-VSL-00004.	The bases for the LFP vessel's material selection and corrosion allowance are furnished in the Corrosion Evaluations. Selection of 316 SS material with a corrosion/erosion allowance of 0.04 in. for the upper head and 0.125 in. for the bottom head and shell for a service life of 40 years is adequate and appropriate. The material selections and corrosion/erosion allowances are correctly carried forward to the Mechanical Data Sheets and are used in the vessel Design Calculations consistently and correctly. A corrosion allowance for the supports is not identified but as mentioned above, the cells should remain dry preventing corrosion of the supports. Therefore, the 304 SS vessel supports are adequate for this application.

Information Assessed		Source of Information	Assessment
Pressure Relief	Pressure controls (vents and relief valves) are adequately designed to ensure pressure relief if normal operating pressures in the vessel are exceeded.	Drawings and System Description listed above under References.	The drawings and System Description document show and/or describe that the LFP Vessels, LFP-VSL-00001/2/3/4 are designed with an unrestricted overflow through a 4" diameter line. The MFVs and MFPVs overflow to a common overflow header to the C3/C5 Drains/Sump Collection Vessel (RLD-VSL-00004) located at Elevation (-) 21'-0". A high-high tank level alarm and trip is designed to prevent the contents from reaching the overflow. The vessels are also connected to the LAW vessel vent system which includes backup power if power is lost during normal operations and a backup fan if one of the two ventilation fans fails. A high pressure alarm will alert operations if the headspace pressure is approaching the surrounding process cell pressure. All above listed features will prevent the over pressurization of the LFP vessels.

Master Distribution Schedule for
WTP Project Subcontract Management Group

SUBMITTAL TRANSMITTAL: ☐ **First Submittal** ☐ **Re-Submittal** ☐ **QVRP Package**
☐ **No Review Required** ☐ **No Review Required Re-Submittal** ☐ **Submittal Supplement**

CORRESPONDENCE: ☒ **With Attachment** ☐ **W/O Attachment (letter only)**
☐ **Fax as Original (Letter Only)** ☐ **Fax as Original (With Attachment)**

☐ **Pre-Award/Award Package** ☐ **Executed Change Order Package**
☐ **Executed Amendment Package** ☐ **Back Charge**

Subcontract Number:	24590-CM-HC4-HXYG-00211
Subcontract Title:	Tank Integrity Design Assessments by IQRPE
Subcontractor Name:	AREVA NC, Inc.
Subcontract Administrator:	Jean Renner

PDC Document Number	Rev	Document Title	Rev
139507	0	AREVA-07-074 transmitting AREVA-IA-100, Rev. 0 "Structural Integrity Assessment for LAW Melter Feed Process System Melter Feed Prep Vessels (LFP-VSL-00001/3) and Melter Feed Vessels (LFP-VSL-00002/4)	0

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			x				

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Attachment 51 – Appendix 9.13
Low Activity Waste Building
Instrument Control Logic and Narrative Description

Where information regarding treatment, management, and disposal of the radioactive source, byproduct material, and/or special nuclear components of mixed waste (as defined by the Atomic Energy Act of 1954, as amended) has been incorporated into this permit, it is not incorporated for the purpose of regulating the radiation hazards of such components under the authority of this permit and chapter 70.105 RCW. In the event of any conflict between Permit Condition III.10.A. and any statement relating to the regulation of source, special nuclear, and byproduct material contained in portions of the permit application that are incorporated into this permit, Permit Condition III.10.A. will prevail.

Additional appendices will be added to this appendix as new information is incorporated into this permit.

Drawings and Documents

Attachment 51 – Appendix 9.13

Low Activity Waste Building
Instrument Control Logic and Narrative Description

The following drawings have been incorporated into Appendix 9.13 and can be viewed at the Ecology Richland Office. **New drawings are in bold lettering**.

Drawing/Document Number	**Description**
24590-LAW-PER-J-02-001, Rev 1	System Logic Description for RLD System
24590-LAW-PER-J-03-001, Rev 0	System Logic Description for LFP System
24590-LAW-PER-J-03-002, Rev 0	System Logic Description for LCP System
24590-LAW-PER-J-03-003, Rev 0	System Logic Description for LOP System
24590-LAW-PER-J-04-0002, Rev 0	System Logic Description for LVP System
RESERVED	RESERVED

R10305653

ISSUED BY RPP-WTP PDC
[handwritten initials] 4/21/04
INIT DATE

Document title: **System Logic Description for the Low-Activity Waste Facility - Radioactive Liquid Waste Disposal (RLD) System**

Contract number: DE-AC27-01RV14136

Department: Controls and Instrumentation

Author(s): EL Vodopest

Principal author signature: Edwd L Vodopest

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Checker signature: DFQueen 4-21-04

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Approved by: SE Anderson

Approver's position: C&I Engineering Manager

Approver signature: S. E. Anderson

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EXPIRES 8/29/05

This bound document contains a total of 17 sheets

River Protection Project
Waste Treatment Plant
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Notice

Please note that source, special nuclear, and byproduct materials, as defined in the Atomic Energy Act of 1954 (AEA), are regulated at the US Department of Energy (DOE) facilities exclusively by DOE acting pursuant to its AEA authority. DOE asserts that, pursuant to the AEA, it has sole and exclusive responsibility and authority to regulate source, special nuclear, and byproduct materials at DOE-owned nuclear facilities. Information contained herein on radionuclides is provided for process description purposes only.

History Sheet

Rev	Date	Reason for revision	Revised by
0	10 October 2002	Issued for Permitting Use	LWO/NJS
1	21 April 2004	Issued for Permitting Use	EL Vodopest

Contents

Figures

Glossary

Acquire	A command, under batch control, that reserves a group of equipment for that particular batch control.
Actual Volume	Volume of waste/process fluid in any vessel in gallons.
Available Space	Volume of waste/process fluid that any vessel can accommodate and still be lower than the upper operating limit (UOL), in gallons. Available space can be calculated as follows: *Available Space = UOL - Actual Volume.*
Available Volume	Volume of waste/process fluid that any vessel can transfer to another vessel and still be above the lower operating limit (LOL), in gallons. Available volume can be calculated as follows: *Available Volume = Actual Volume - LOL.*
Batch	The material that is being produced or that has been produced by a single execution of a batch process.
Batch Control	Control activities and control functions that provide a means to process (that is, an ordered set of processing activities) finite quantities of material over a finite period of time using one or more pieces of equipment.
Batch Process	A process that leads to the production of finite quantities of material by subjecting quantities of input material to an ordered set of processing activities over a finite period of time using one or more pieces of equipment.
Exception Handling	Those functions that deal with plant or process contingencies and other events that occur outside the normal or desired behavior of batch control.
Permissive	Interlock that allows a device to change state or a sequence to start. Once a device has changed state or a sequence has started, permissives have no further effect on the device or sequence.
Release	A command under a batch control that opens up a group of equipment for any batch control to acquire.
Trip	Interlock that does not allow a device to change state or a sequence to start. Once a device has changed state or a sequence has started, trips continue to have an effect on the device or sequence.

Acronyms and Abbreviations

AEA	Atomic Energy Act of 1954
DOE	US Department of Energy
HS	hand switch
LALL	level alarm low low
LAHH	level alarm high high
LAW	low-activity waste
LI	level indicator
LKI	level computation indicator
LKY	level computation relay
LSHH	level switch high high
LSLL	level switch low low
LT	level transmitter
LY	level relay
PCJ	process control system
PT	pretreatment (facility)
RLD	radioactive liquid waste disposal system
SBS	submerged bed scrubber

1 Introduction

This document describes the instrument control logic for tank and ancillary equipment for the Radioactive Liquid Waste Disposal System (RLD) in the low-activity waste (LAW) facility associated with dangerous waste management.

2 Applicable Documents

WAC 173-303, *Dangerous Waste Regulations*, Washington Administrative Code, as amended.

3 Description

3.1 Below Grade System Requirements

The tank and ancillary equipment associated with dangerous waste management in the LAW system and residing below the 0 ft elevation of the RLD system follow:

- RLD-VSL-00004 C3/C5 drains/sump collection vessel
- RLD-BULGE-00001 C3/C5 drains/sump collection pump bulge
- RLD-SUMP-00028 RLD-VSL-00004 cell sump

3.1.1 C3/C5 Drains/Sump Collection Vessel RLD-VSL-00004

The C3/C5 drains/sump collection vessel (RLD-VSL-00004) is at the –21 ft elevation in an enclosed C3/C5 cell area, room L-B001B. The vessel overflows to sump RLD-SUMP-00028 in the same cell. This sump is evacuated by pump RLD-PMP-00004 and transferred to the plant wash vessel (RLD-VSL-00003), at the 2 ft elevation.

The C3/C5 drains/sump collection vessel (RLD-VSL-00004) and cell are designed to contain the maximum amount of fire protection water necessary to cover the largest C3/C5 area. If a fire activates the sprinkler system, the firewater will drain into the vessel through floor drains. If the volume reaches the overflow level during off-normal operation, the contents will overflow onto the floor of the C3/C5 cell at the –21 ft elevation. The C3/C5 cell contains a stainless steel liner, to provide secondary containment.

The C3/C5 drains/sump collection vessel (RLD-VSL-00004) is constructed of 6 % molybdenum stainless steel and collects a constant liquid purge, gravity drained from the wet electrostatic precipitators (LOP-WESP-00001 and LOP-WESP-00002), located at 2 ft elevation. The overflow from the concentrate receipt vessels (LCP-VSL-00001 and LCP-VSL-00002), at the 2 ft elevation, and the melter feed preparation vessels (LFP-VSL-00001 and LFP-VSL-00003), also at the 2 ft elevation, is routed to this vessel. The C3/C5 drains/sump collection vessel (RLD-VSL-00004) is vented into a common vessel ventilation header system, which returns drains back into the same vessel.

The C3/C5 drains/sump collection vessel (RLD-VSL-00004) level is continuously monitored by redundant level transmitters RLD-LT-2205 and RLD-LT-2206. At a predetermined setpoint, the operator is notified that effluent level has risen to a point where transfer is required. The operator then selects the target vessel and initiates the transfer sequence. Once initiated, the process control system (PCJ) verifies that all instruments, utilities, and equipment associated with the transfer are within operational parameters. Next, an automated process sample is taken to document solids content and effluent characteristics. Before the sequence proceeds further, the PCJ system calculates the transfer volume to ensure that the effluent volume will not overflow the selected target vessel (plant wash vessel RLD-VSL-00003 or submerged bed scrubber [SBS] condensate collection vessel RLD-VSL-00005). If the volume to be transferred exceeds the volume of the target vessel, the PCJ system will not allow the transfer to occur; the sequence will be placed on hold awaiting resolution and restart by Operations. The transfer will end when either the level in the C3/C5 drains/sump collection vessel (RLD-VSL-00004) reaches its low-level control point or the selected target vessel reaches its high-level control point.

To prevent a possible overflow and loss of primary containment, the PCJ system alarms at two high-level setpoints. At high-level setpoint, the PCJ system initiates a high alarm and alerts the operator. At high-high level setpoint, the PCJ system initiates a critical alarm and alerts the operator. Figure 1 depicts the instrumentation associated with the C3/C5 drains/sump collection vessel (RLD-VSL-00004).

3.1.2 C3/C5 Drains/Sump Collection Pump Bulge RLD-BULGE-00001

The C3/C5 drains/sump collection vessel (RLD-VSL-00004) is connected by through-wall piping to the C3/C5 drains/sump collection pump bulge (RLD-BULGE-00001), which is equipped with recirculation/transfer pumps (RLD-PMP-00002A/B). The recirculation/transfer pump discharge is routed to the vessel mixing eductors to maintain solids in constant suspension.

The C3/C5 drains/sump collection transfer pumps (RLD-PMP-00002A/B) are centrifugal pumps contained in the C3/C5 drains/sump collection pump bulge. Pump discharge can be routed to either SBS condensate collection vessel (RLD-VSL-00005) or plant wash vessel (RLD-VSL-00003), both at 2 ft elevation. Sampling capability is provided using a sampling leg off the pump recirculation line to autosampler unit (ASX-SMPLR-00013).

3.1.3 RLD-VSL-00004 Cell Sump RLD-SUMP-00028

C3/C5 drains/sump collection vessel (RLD-VSL-00004) overflows to RLD-VSL-00004 cell sump (RLD-SUMP-00028), located in the same cell. As required, on a semi-automatic basis, this sump is emptied by RLD-VSL-00004 cell sump pump (RLD-PMP-00004) to the plant wash vessel (RLD-VSL-00003), at the 2 ft elevation.

To detect an overflow from C3/C5 drains/sump collection vessel (RLD-VSL-00004) or a leak outside of the primary containment vessel and within the C3/C5 cell, level instrument RLD-LT-2233 monitors the level of effluent in the cell sump. At high level, the PCJ system will alert the operator. The operator may then initiate the transfer sequence. At the high-high level setpoint, the PCJ system automatically initiates the transfer sequence. However, in both cases, before a transfer can proceed, the PCJ system calculates transfer volume to ensure that the volume will not overflow the plant wash vessel (RLD-VSL-00003). If the volume to be transferred exceeds the volume of the plant wash vessel (RLD-VSL-00003), the PCJ system will not allow the transfer to occur; the sequence will be placed on hold awaiting resolution. Additionally, the PCJ system monitors and calculates rate of change ("rate of rise") of the effluent level. If the rate of change exceeds a predetermined programmed value, the PCJ system will alarm and alert the operator. RLD-VSL-00004 cell sump pump (RLD-PMP-00004) is stopped on reaching low-low level shut-off point. Figure 2 depicts the instrumentation associated with RLD-VSL-00004 cell sump (RLD-SUMP-00028).

3.2 Above Grade System Requirements

The tank and ancillary equipment associated with dangerous waste management in the LAW system and residing above the 0 ft elevation of the RLD system follow:

- RLD-VSL-00003 plant wash vessel
- RLD-VSL-00005 SBS condensate collection vessel
- RLD-BULGE-00004 plant wash/SBS condensate collection vessel valve bulge
- RLD-SUMP-00029 L-0123 process cell waste disposal west sump
- RLD-SUMP-00030 L-0123 process cell waste disposal east sump
- RLD-SUMP-00031 L-0124 process cell waste disposal west sump
- RLD-SUMP-00032 L-0124 process cell waste disposal east sump
- RLD-SUMP-00035 L-0126 effluent cell waste disposal west sump
- RLD-SUMP-00036 L-0126 effluent cell waste disposal east sump

3.2.1 Plant Wash Vessel RLD-VSL-00003

The plant wash vessel (RLD-VSL-00003) is at the 2 ft elevation in an enclosed wet process C5 cell, room L-0126. The vessel overflows via overflow line to the C3/C5 drains/sump collection vessel (RLD-VSL-00004) in another cell, room L-B001B, at the −21 ft elevation.

The effluent cell, room L-0126, supports a stainless steel liner sized to provide secondary containment. The welded vessel, process cell containment, and the overflow system meet the requirement to minimize system leaks.

The plant wash vessel (RLD-VSL-00003) is constructed of 6 % molybdenum stainless steel alloy. The plant wash vessel (RLD-VSL-00003) receives off-specification feed from the concentrate receipt vessels (LCP-VSL-00001 and LCP-VSL-00002); effluent from the SBS condensate collection vessel (RLD-VSL-00005) under off-normal operations; off-specification effluents from the C1/C2 drains/sump collection vessel (NLD-VSL-00005); drains from the caustic collection vessel (LVP-VSL-00001) berm; effluent from the C3/C5 drains/sump collection vessel (RLD-VSL-00004); overflow from the SBS condensate collection vessel (RLD-VSL-00005); sump discharges from process cells L-0123 and L-0124 and effluent cell L-0126; and plant wash vessel (RLD-VSL-00003) vessel washings. During a batch process, if the plant wash vessel mechanical agitator (RLD-AGT-00001) receives permissives to operate, the vessel contents are agitated to provide a representative sample. The vessel is vented via a vessel ventilation header into the LAW secondary offgas/vessel vent process system (LVP) that connects to the C3/C5 drains/sump collection vessel (RLD-VSL-00004).

The plant wash vessel (RLD-VSL-00003) level is continuously monitored by redundant level transmitters RLD-LT-2130 and RLD-LT-2131. The operator selects the primary transmitter. This actual level signal inputs to the functional logic and batch controls and calculates actual volume. The PCJ system monitors effluent level to control transfers. As part of the batch control, the operator releases and acquires the target vessel pretreatment (PT) plant wash vessel (PWD-VSL-00044) and initiates the collected effluent transfer sequence using a plant wash vessel discharge pump (RLD-PMP-00001A or RLD-PMP-00001B).

Once initiated, the PCJ system verifies that all instruments, utilities, and equipment associated with the transfer are within operational parameters. Next, an automated process sample may be taken to document solids content and effluent characteristics. Before the sequence proceeds further, the PCJ system calculates transfer (available) volume to assist the operator and verify that the slurry volume will not overflow the selected target vessel available space. The transfer will end when the level in the plant wash vessel (RLD-VSL-00003) reaches its low-level functional logic control point, a batch is transferred, or the selected target vessel reaches its actual high-level batch control point. Low-low level trips will stop the plant wash vessel mechanical agitator (RLD-AGT-00001) and plant wash vessel discharge pumps (RLD-PMP-00001A or RLD-PMP-00001B).

To prevent a possible overflow, the PCJ system alarms at two high-level setpoints. At high-level setpoint, the PCJ system initiates a high alarm and alerts the operator. At high-high level setpoint, the PCJ system initiates a critical alarm and alerts the operator. Additionally, a high-high level during a procedural transfer from the RLD-VSL-00004 cell, process cells L-0123 and L-0124, and effluent cell L-0126 sumps will initiate exception handling to mitigate plant wash vessel (RLD-VSL-00003) overfill. Figure 3 depicts the instrumentation associated with the plant wash vessel (RLD-VSL-00003).

3.2.2 SBS Condensate Collection Vessel RLD-VSL-00005

The SBS condensate collection vessel (RLD-VSL-00005) is at the 2 ft elevation in an enclosed effluent C5 cell, room L-0126. The vessel overflows via overflow line to the plant wash vessel (RLD-VSL-00003) in the same cell.

The effluent cell, room L-0126, supports a stainless steel liner sized to provide secondary containment. The welded vessel, process cell containment, and the overflow system meet the requirement to minimize system leaks.

The SBS condensate collection vessel (RLD-VSL-00005) is constructed of 6 % molybdenum stainless steel alloy. The SBS condensate collection vessel (RLD-VSL-00005) receives SBS column purge effluent from the melter 1 SBS (LOP-SCB-00001), melter 2 SBS (LOP-SCB-00002), melter 1 SBS condensate vessel (LOP-VSL-00001), and melter 2 SBS condensate vessel (LOP-VSL-00002). During a batch process, if the SBS condensate mechanical agitator (RLD-AGT-00002) receives permissives to operate, the vessel contents are agitated to provide a representative sample. The vessel is vented via a vessel ventilation header into the LAW secondary offgas/vessel vent process system (LVP) that connects to the C3/C5 drains/sump collection vessel (RLD-VSL-00004).

The SBS condensate collection vessel (RLD-VSL-00005) level is continuously monitored by redundant level transmitters RLD-LT-2142 and RL-LT-2143. The operator selects the primary transmitter. This actual level signal inputs to the functional logic and batch controls and calculates actual volume. The PCJ system monitors effluent level to control batch transfers. As part of the batch control, the operator releases and acquires the target vessel PT LAW SBS condensate receipt vessel (TLP-VSL-00009A) or PT LAW SBS condensate receipt vessel (TLP-VSL-00009B) and initiates the transfer sequence using a RLD-VSL-00005 discharge pump (RLD-PMP-00003A or RLD-PMP-00003B).

Once initiated, the PCJ system verifies that all instruments, utilities, and equipment associated with the transfer are within operational parameters. Next, an automated process sample may be taken to document solids content and effluent characteristics. Before the sequence proceeds further, the PCJ system calculates transfer (available) volume to assist the operator and verify that the slurry volume will not overflow the selected target vessel available space. The transfer will end when the level in the SBS condensate collection vessel (RLD-VSL-00005) reaches its low-level functional logic control point, a batch is transferred, or the selected target vessel reaches its actual high-level batch control point.

Low-low level trips will stop the SBS condensate mechanical agitator (RLD-AGT-00002) and RLD-VSL-00005 discharge pumps (RLD-PMP-00003A or RLD-PMP-00003B).

To prevent a possible overflow, the PCJ system alarms at two high-level setpoints. At the high-level setpoint, the PCJ system initiates a high alarm and alerts the operator. At the high-high level setpoint, the PCJ system initiates a critical alarm and alerts the operator. Additionally, a high-high level during a procedural transfer from another vessel will initiate exception handling to mitigate SBS condensate collection vessel (RLD-VSL-00005) overfill. Figure 4 depicts the instrumentation associated with the SBS condensate collection vessel (RLD-VSL-00005).

3.2.3 Plant Wash/SBS Condensate Collection Vessel Valve Bulge RLD-BULGE-00004

The plant wash/SBS condensate collection vessel valve bulge (RLD-BULGE-00004) is at the 28 ft elevation in the process cell charge floor C3 area, room L-0202. The plant wash/SBS condensate collection vessel valve bulge (RLD-BULGE-00004) is connected by through-floor piping back down to plant wash vessel (RLD-VSL-00003) and SBS condensate collection vessel (RLD-VSL-00005). The two inter-facility transfer lines from the LAW facility are cross-connected at the plant wash/SBS condensate collection vessel valve bulge (RLD-BULGE-00004) via a normally closed valve, and are also cross-connected inside the PT facility via normally closed valves in the hot cell to the PT plant wash vessel (PWD-VSL-00044) and the PT LAW SBS condensate receipt vessels (TLP-VSL-00009A/B).

Plant wash vessel (RLD-VSL-00003) effluent is primarily discharged via a single wall line up to the plant wash/SBS condensate collection vessel valve bulge (RLD-BULGE-00004), continues to the C3/C5 drain collection cell room L-B001B at the –21 ft elevation, then via coaxial lines to the PT plant wash vessel (PWD-VSL-00044), at the PT facility.

SBS condensate collection vessel (RLD-VSL-00005) effluent is primarily discharged via a single wall line up to the plant wash/SBS condensate collection vessel valve bulge (RLD-BULGE-00004), continues to the C3/C5 drain collection cell room L-B001B at the –21 ft elevation, then via coaxial lines to the LAW SBS condensate receipt vessels (TLP-VSL-00009A/B), at the PT facility.

During off-normal operation, any bulge drain volume contents will overflow via through-floor piping into the L-0126 effluent cell waste disposal west sump (RLD-SUMP-00035), at the 2 ft elevation in the enclosed effluent cell, room L-0126.

3.2.4 Process Cells Waste Disposal Sumps

Melter 1 valve bulge (LOP-BULGE-00001) and concentrate receipt valve bulges (LCP-BULGE-00001 and LCP-BULGE-00002), at the 28 ft elevation in the process cell charge floor C3 area, room L-0202, drain by through-floor piping back down to L-0123 process cell waste disposal west sump (RLD-SUMP-00029). As required, on a semi-automatic basis, this sump is emptied by L-0123 process cell west sump pump (RLD-PMP-00025) to the plant wash vessel (RLD-VSL-00003) at the 2 ft elevation in wet process C5 cell, room L-0126. To detect a leak outside of the primary containment vessels and within the C5 cell, level instrument RLD-LT-2301 monitors the level of effluent in the cell sump. L-0123 process cell west sump pump (RLD-PMP-00025) is stopped on reaching low-low level shut-off point.

Melter 1 feed/prep valve bulge (LFP-BULGE-00001), at the 28 ft elevation in the process cell charge floor C3 area, room L-0202, and the melter 1 feed line encasement all drain to L-0123 process cell waste disposal east sump (RLD-SUMP-00030). As required, on a semi-automatic basis, this sump is emptied by L-0123 process cell east sump pump (RLD-PMP-00026) to the plant wash vessel (RLD-VSL-00003) at the 2 ft elevation in wet process C5 cell, room L-0126. To detect drain accumulation or leak outside of the primary containment vessels and within the C5 cell, level instrument RLD-LT-2302 monitors the level of effluent in the cell sump. L-0123 process cell east sump pump (RLD-PMP-00026) is stopped on reaching low-low level shut-off point.

Melter 2 valve bulge (LOP-BULGE-00002), at the 28 ft elevation in the process cell charge floor C3 area, room L-0202, drains by through-floor piping back down to L-0124 process cell waste disposal west sump (RLD-SUMP-00031). As required, on a semi-automatic basis, this sump is emptied by L-0124 process cell west sump pump (RLD-PMP-00027) to the plant wash vessel (RLD-VSL-00003) at the 2 ft elevation in wet process C5 cell, room L-0126. To detect a leak outside of the primary containment vessels and within the C5 cell, level instrument RLD-LT-2303 monitors the level of effluent in the cell sump. L-0124 process cell west sump pump (RLD-PMP-00027) is stopped on reaching low-low level shut-off point.

Concentrate receipt valve bulge (LCP-BULGE-00003) and melter 2 feed/prep valve bulge (LFP-BULGE-00002), at the 28 ft elevation in the process cell charge floor C3 area, room L-0202, and melter 2 feed line encasement all drain to L-0124 process cell waste disposal east sump (RLD-SUMP-00032). As required, on a semi-automatic basis, this sump is emptied by L-0124 process cell east sump pump (RLD-PMP-00028) to the plant wash vessel (RLD-VSL-00003) at the 2 ft elevation in wet process C5 cell, room L-0126. To detect drain accumulation or leak outside of the primary containment vessels and within the C5 cell, level instrument RLD-LT-2304 monitors the level of effluent in the cell sump. L-0124 process cell east sump pump (RLD-PMP-00028) is stopped on reaching low-low level shut-off point.

Upon reaching process cell waste disposal sump high level, the PCJ system will alert the operator. The operator may then initiate the transfer sequence. Upon reaching the high-high level setpoint, the PCJ system automatically initiates the transfer sequence. Before the sequence proceeds further, the PCJ system calculates the transfer (available) volume to assist the operator not to overflow the selected target vessel available space. The transfer will end when either the level in the sump reaches its low-level functional logic control point, a batch is transferred, or the selected target plant wash vessel (RLD-VSL-00003) reaches its actual high-level batch control point. Additionally, the PCJ system monitors and calculates rate of change of the effluent level. If the rate of change exceeds a predetermined programmed value, the PCJ system will alarm and alert the operator. Figure 2 depicts the instrumentation associated with process cells waste disposal sumps.

3.2.5 Effluent Cell Waste Disposal Sumps

Plant wash/SBS condensate collection vessel valve bulge (RLD-BULGE-00004), at the 28 ft elevation in the process cell charge floor C3 area, room L-0202, drains by through-floor piping back down to L-0126 effluent cell waste disposal east sump (RLD-SUMP-00036). As required, on a semi-automatic basis, this sump is emptied by L-0126 effluent cell east sump pump (RLD-PMP-00032) to the plant wash vessel (RLD-VSL-00003) at the 2 ft elevation in wet process C5 cell, room L-0126. To detect drain accumulation or leak outside of the primary containment vessels and within the C5 cell, level instrument RLD-LT-2308 monitors the level of effluent in the cell sump. L-0126 effluent cell east sump pump (RLD-PMP-00032) is stopped on reaching low-low level shut-off point.

In-cell leaks also accumulate at L-0126 effluent cell waste disposal west sump (RLD-SUMP-00036). As required, on a semi-automatic basis, this sump is emptied by L-0126 effluent cell west sump pump (RLD-PMP-00031) to the plant wash vessel (RLD-VSL-00003) at the 2 ft elevation in wet process C5 cell, room L-0126. In-cell leak outside of the primary containment vessels and within the C5 cell, level instrument RLD-LT-2307 monitors the level of effluent in the cell sump. L-0126 effluent cell east sump pump (RLD-PMP-00031) is stopped on reaching low-low level shut-off point.

Upon reaching process cells waste disposal sump high level, the PCJ system will alert the operator. The operator may then initiate the transfer sequence. Upon reaching the high-high level setpoint, the PCJ system automatically initiates the transfer sequence. Before the sequence proceeds further, the PCJ system calculates the transfer (available) volume to assist the operator not to overflow the selected target vessel available space. The transfer will end when either the level in the sump reaches its low-level functional logic control point, a batch is transferred, or the selected target plant wash vessel (RLD-VSL-00003) reaches its actual high-level batch control point. Additionally, the PCJ system monitors and calculates rate of change of the effluent level. If the rate of change exceeds a predetermined programmed value, the PCJ system will alarm and alert the operator. Figure 2 depicts the instrumentation associated with process cells waste disposal sumps.

Figure 1 RLD-LT-2205 and RLD-LT-2206 for RLD-VSL-00004

Note: This figure is an update of Figure 1 of 24590-LAW-PER-J-02-001, Rev 0.

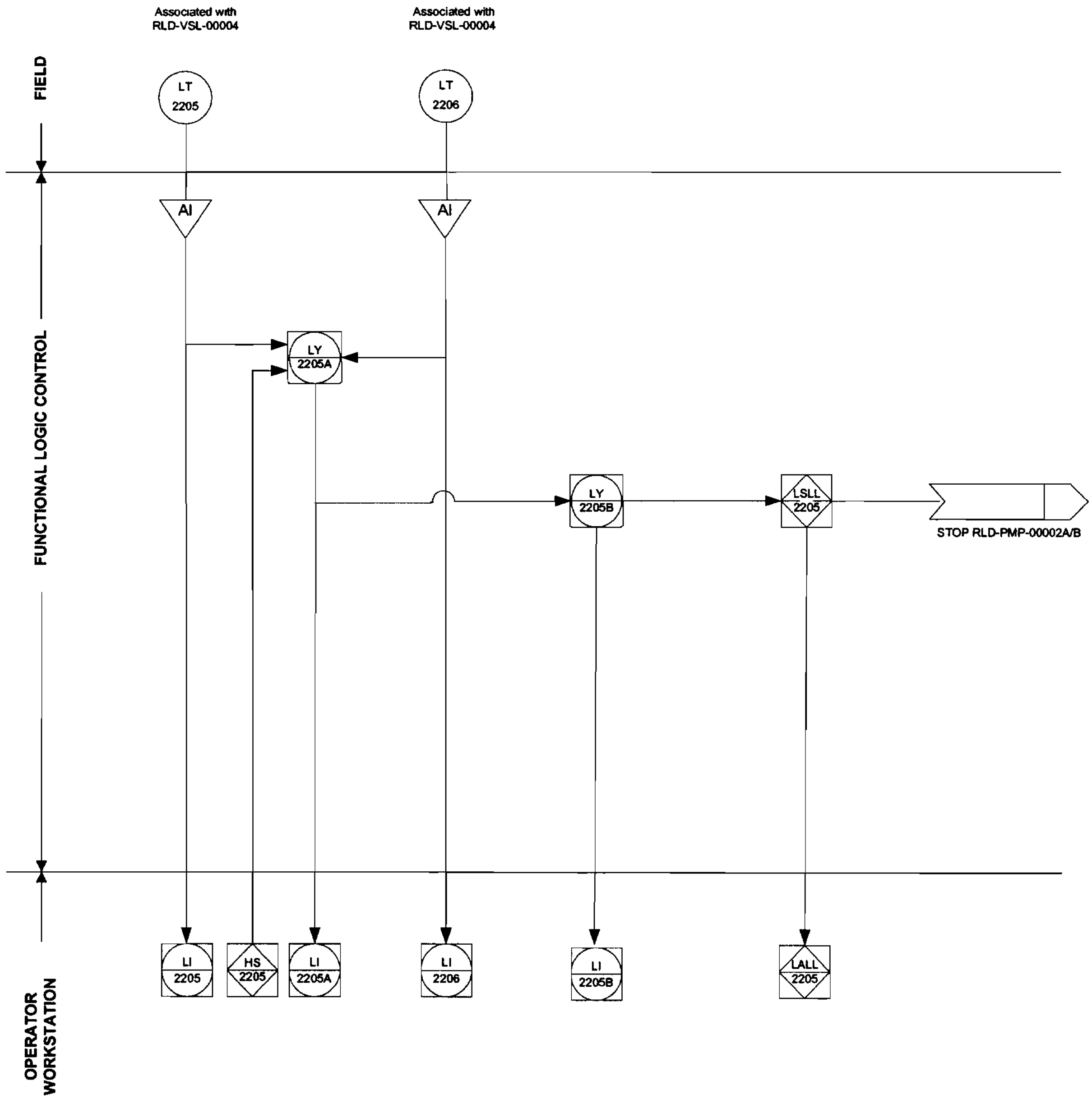
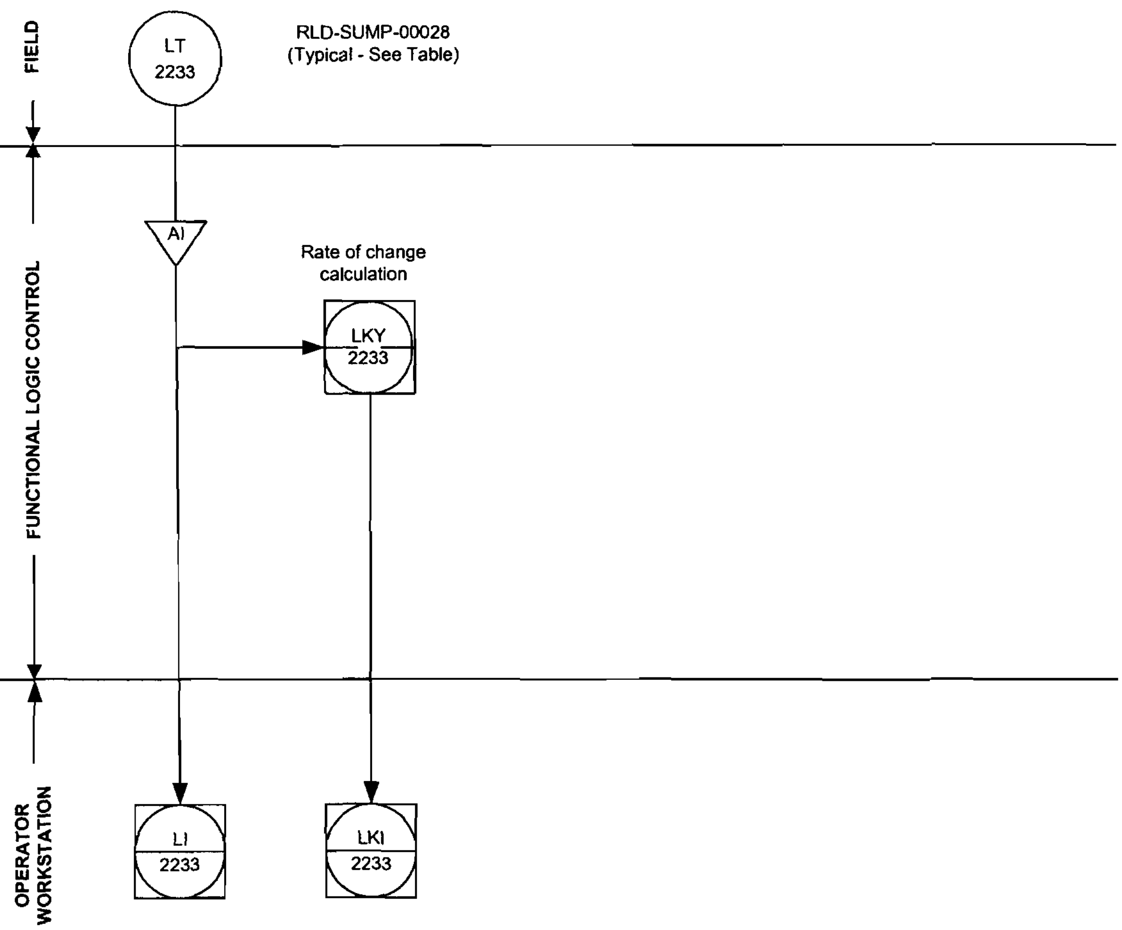


Figure 2 Level for Sumps

Note: This figure is an update of Figure 2 of 24590-LAW-PER-J-02-001, Rev 0.



Sump	LT	LI	LKY	LKI	Pump
RLD-SUMP-00028	RLD-LT-2233	RLD-LI-2233	RLD-LKY-2233	RLD-LKI-2233	RLD-PMP-00004
RLD-SUMP-00029	RLD-LT-2301	RLD-LI-2301	RLD-LKY-2301	RLD-LKI-2301	RLD-PMP-00025
RLD-SUMP-00030	RLD-LT-2302	RLD-LI-2302	RLD-LKY-2302	RLD-LKI-2302	RLD-PMP-00026
RLD-SUMP-00031	RLD-LT-2303	RLD-LI-2303	RLD-LKY-2303	RLD-LKI-2303	RLD-PMP-00027
RLD-SUMP-00032	RLD-LT-2304	RLD-LI-2304	RLD-LKY-2304	RLD-LKI-2304	RLD-PMP-00028
RLD-SUMP-00035	RLD-LT-2307	RLD-LI-2307	RLD-LKY-2307	RLD-LKI-2307	RLD-PMP-00031
RLD-SUMP-00036	RLD-LT-2308	RLD-LI-2308	RLD-LKY-2308	RLD-LKI-2308	RLD-PMP-00032

Figure 3 RLD-LT-2130 and RLD-LT-2131 for RLD-VSL-00003

Note: This figure is in addition to the two figures originally in 24590-LAW-PER-J-02-001, Rev 0.

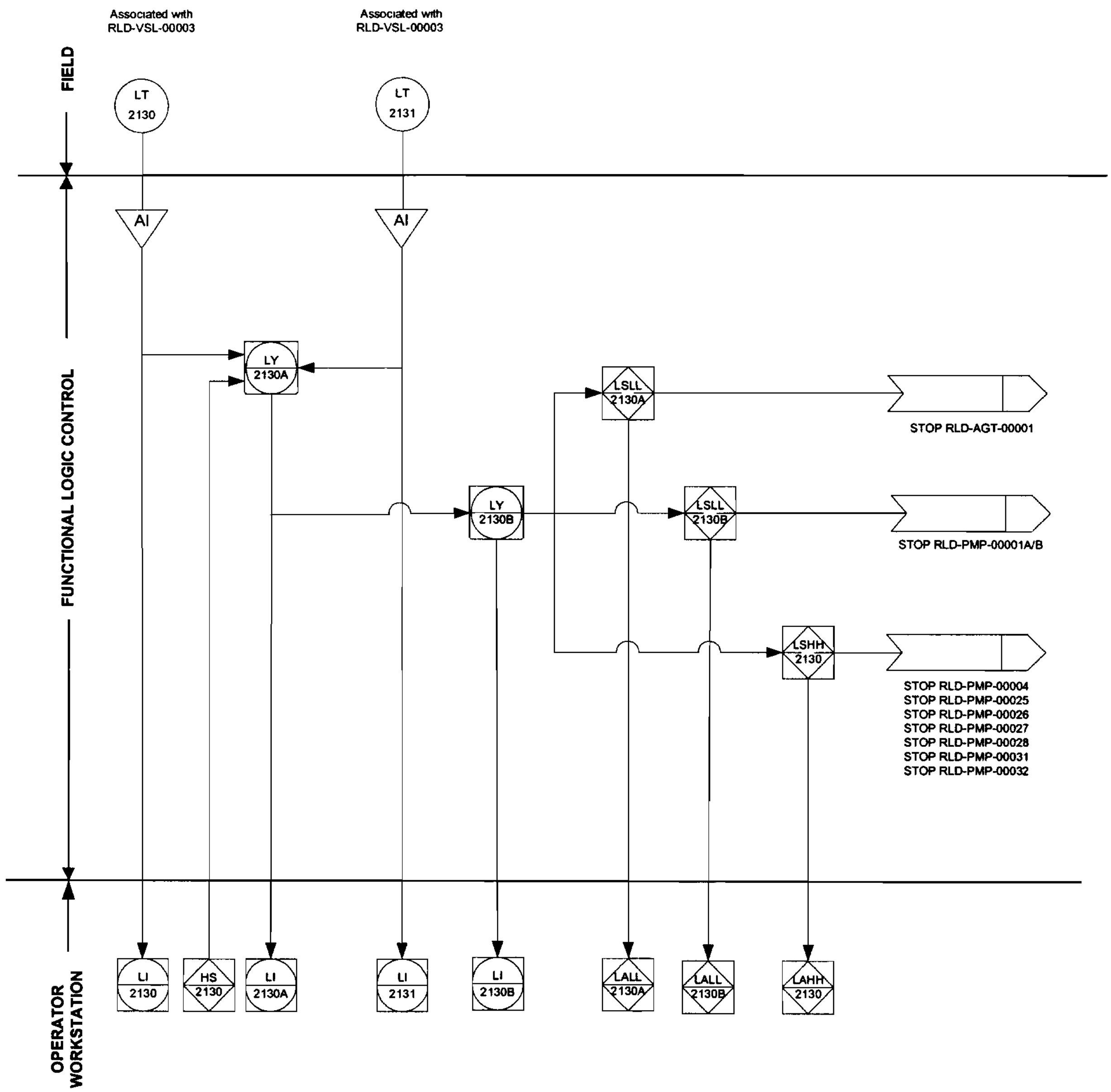
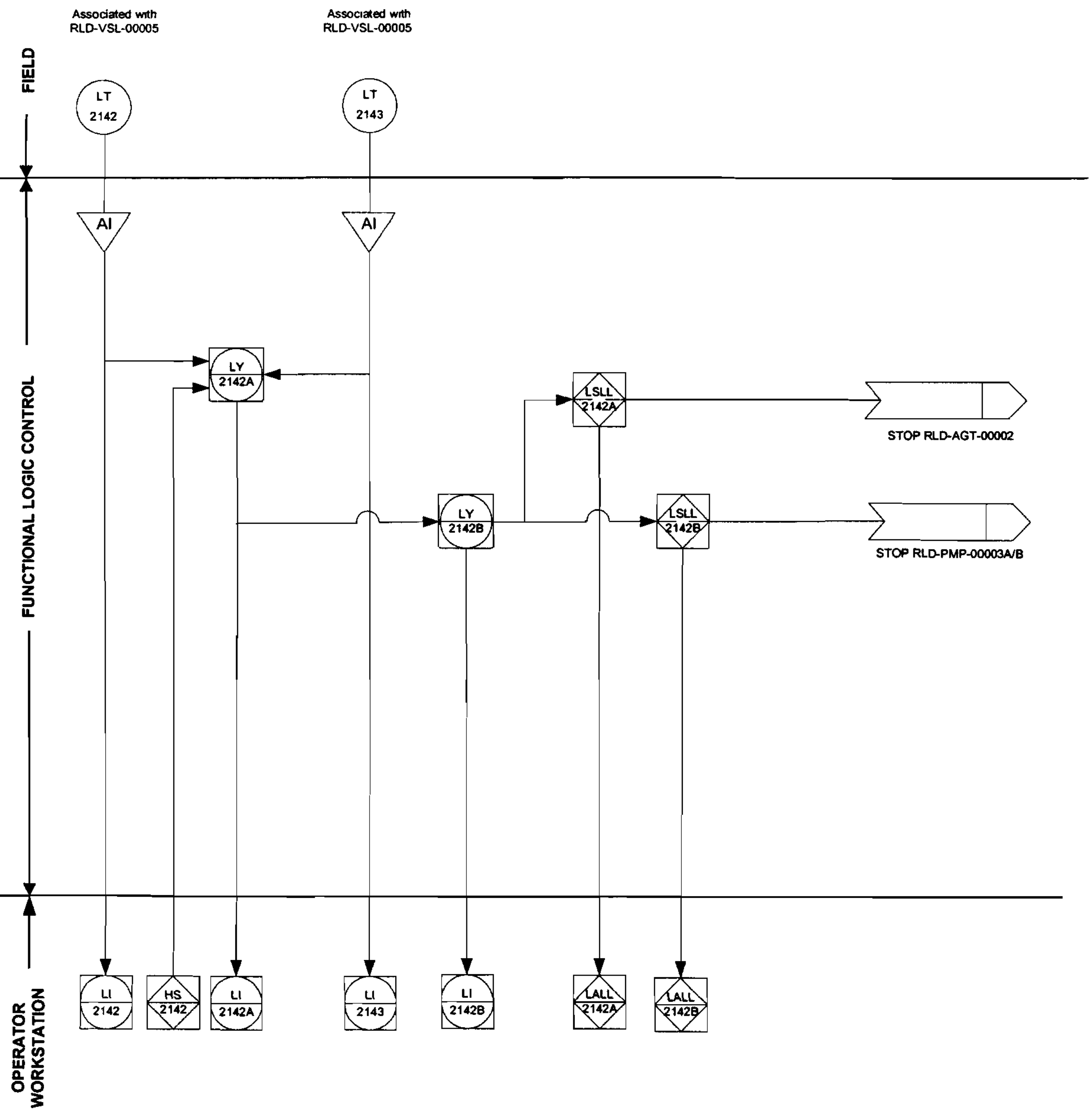


Figure 4 RLD-LT-2142 and RLD-LT-2143 for RLD-VSL-00005

Note: This figure is in addition to the two figures originally in 24590-LAW-PER-J-02-001, Rev 0.



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History Sheet

Rev	Date	Reason for revision	Revised by
0	27 April 2004	Issued for permitting use	EL Vodopest

Contents

Figures

Glossary

Acquire	A command, under batch control, that reserves a group of equipment for that particular batch control.
Actual Volume	Volume of waste/process fluid in any vessel in gallons.
Available Space	Volume of waste/process fluid that any vessel can accommodate and still be lower than the upper operating limit (UOL), in gallons. Available space can be calculated as follows: *Available Space = UOL - Actual Volume.*
Available Volume	Volume of waste/process fluid that any vessel can transfer to another vessel and still be above the lower operating limit (LOL), in gallons. Available volume can be calculated as follows: *Available Volume = Actual Volume - LOL.*
Batch	The material that is being produced or that has been produced by a single execution of a batch process.
Batch Control	Control activities and control functions that provide a means to process (that is, an ordered set of processing activities) finite quantities of material over a finite period of time using one or more pieces of equipment.
Batch Process	A process that leads to the production of finite quantities of material by subjecting quantities of input material to an ordered set of processing activities over a finite period of time using one or more pieces of equipment.
Exception Handling	Those functions that deal with plant or process contingencies and other events that occur outside the normal or desired behavior of batch control.
Permissive	Interlock that allows a device to change state or a sequence to start. Once a device has changed state or a sequence has started, permissives have no further effect on the device or sequence.
Release	A command under a batch control that opens up a group of equipment for any batch control to acquire.
Trip	Interlock that does not allow a device to change state or a sequence to start. Once a device has changed state or a sequence has started, trips continue to have an effect on the device or sequence.

Acronyms and Abbreviations

AEA	Atomic Energy Act of 1954
AI	alarm indicator
DOE	US Department of Energy
HS	hand switch
LAHH	level alarm high high
LALL	level alarm low low
LAW	low-activity waste
LCP	LAW concentrate receipt process system
LFP	LAW melter feed process system
LI	level indicator
LOL	lower operating limit
LSHH	level switch high high
LSLL	level switch low low
LT	level transmitter
LY	level relay
PCJ	process control system
UOL	upper operating limit

1 Introduction

This document describes the instrument control logic for tank and ancillary equipment within the low-activity waste (LAW) facility for the LAW melter feed process system (LFP) associated with dangerous waste management. This document focuses on tank and ancillary equipment for the LFP system above the 0 ft elevation within the LAW facility.

2 Applicable Documents

WAC 173-303, *Dangerous Waste Regulations*, Washington Administrative Code, as amended.

3 Description

3.1 System Requirements

The tank and ancillary equipment associated with dangerous waste management within the LAW system and residing above the 0 ft elevation of the LFP system consists of the following:

- LFP-BULGE-00001 melter 1 feed/prep valve bulge
- LFP-BULGE-00002 melter 2 feed/prep valve bulge
- LFP-VSL-00001 melter 1 feed prep vessel
- LFP-VSL-00002 melter 1 feed vessel
- LFP-VSL-00003 melter 2 feed prep vessel
- LFP-VSL-00004 melter 2 feed vessel

3.1.1 Melter 1 Feed Prep Vessel (LFP-VSL-00001)

The melter 1 feed prep vessel (LFP-VSL-00001) is at the 2 ft elevation in an enclosed wet process C5 cell, room L-0123. The vessel receives any overflow from the melter 1 feed vessel (LFP-VSL-00002). The vessel overflows via an overflow header to the C3/C5 drains/sump collection vessel (RLD-VSL-00004) in another cell, room L-B001B, at the –21 ft elevation.

The wet process C5 cell, room L-0123, supports a stainless steel liner sized to provide secondary containment.

The melter 1 feed prep vessel (LFP-VSL-00001) is constructed of 316 stainless steel and receives treated tank farm liquid waste from the concentrate receipt vessels (LCP-VSL-00001 or LCP-VSL-00002), also at the 2 ft elevation. During a batch process glass formers are added to the waste. If the melter 1 feed prep vessel agitator (LFP-AGT-00001) receives permissives to operate, it blends the waste to form a melter feed. The vessel is vented via a vessel ventilation header into the LAW secondary offgas/vessel vent process system (LVP).

The melter 1 feed prep vessel (LFP-VSL-00001) level is continuously monitored by redundant level transmitters LFP-LT-1124 and LFP-LT-1140. The operator selects the primary transmitter. This actual level signal inputs to the functional logic and batch controls and calculates actual volume. The process control system (PCJ) monitors level to control melter feed batch transfers. As part of the batch control, the operator releases and acquires the target vessel melter 1 feed vessel (LFP-VSL-00002) or melter 2 feed vessel (LFP-VSL-00004) and initiates the transfer sequence using a melter 1 feed prep pump (LFP-PMP-00001A or LFP-PMP-00001B).

Once initiated, the PCJ system verifies that the instruments, utilities, and equipment associated with the transfer are within operational parameters. Before the sequence proceeds further, the transfer (available) volume is calculated by the PCJ system to assist the operator and verify that the volume will not overflow the selected target vessel available space. The transfer will end when either the level in the melter 1 feed prep vessel (LFP-VSL-00001) reaches its low-level functional logic control point, a batch is transferred, or the selected target vessel reaches its actual high-level batch control point. Low-low level trips will stop the melter 1 feed prep vessel agitator (LFP-AGT-00001) and melter 1 feed prep pumps (LFP-PMP-00001A or LFP-PMP-00001B).

To prevent a possible overflow, the PCJ system alarms at two different high-level setpoints. At high-level setpoint, the PCJ system initiates a high alarm and alerts the operator. At high-high level setpoint, the PCJ system initiates a critical alarm and alerts the operator. Additionally, a high-high level during a procedural transfer from another vessel will initiate exception handling to mitigate vessel overfill. Figure 1 depicts the instrumentation associated with the melter 1 feed prep vessel (LFP-VSL-00001).

3.1.2 Melter 1 Feed Vessel (LFP-VSL-00002)

The melter 1 feed vessel (LFP-VSL-00002) is at the 2 ft elevation in an enclosed wet process C5 cell, room L-0123. The vessel overflows via an overflow header to the melter 1 feed prep vessel (LFP-VSL-00001) in the enclosed wet process C5 cell, room L-0123.

The wet process C5 cell, room L-0123, supports a stainless steel liner sized to provide secondary containment.

The melter 1 feed vessel (LFP-VSL-00002) is constructed of 316 stainless steel and receives a blended melter feed of treated tank farm liquid waste from the melter 1 feed prep vessel (LFP-VSL-00001) or the melter 2 feed prep vessel (LFP-VSL-00003). The vessel is vented via a vessel ventilation header into the LVP system.

The melter 1 feed vessel (LFP-VSL-00002) level is continuously monitored by redundant level transmitters LFP-LT-1145 and LFP-LT-1146. The operator selects the primary transmitter. This actual level signal inputs to the functional logic and batch controls and calculates actual volume. The PCJ system monitors level to control melter feed batch transfers. As part of the nonmelter feed batch control, the operator releases and acquires the target melter 1 feed prep vessel (LFP-VSL-00001), melter 2 feed prep vessel (LFP-VSL-00003), or plant wash vessel (RLD-VSL-00003). The transfer sequence uses melter 1 feed vessel pump (LFP-PMP-00002).

Once initiated, the PCJ system verifies that the instruments, utilities, and equipment associated with transfer are within operational parameters. Before the nonmelter transfer sequence proceeds further, the transfer (available) volume is calculated by the PCJ system to assist the operator and verify that the volume will not overflow the selected target vessel available space. The nonmelter transfers will end when either the level in the melter 1 feed vessel (LFP-VSL-00002) reaches its low-level functional logic control point, a batch is transferred, or the selected target vessel reaches its high-level batch control point. Low-low level trips will stop the melter 1 feed vessel agitator (LFP-AGT-00002) and melter 1 feed vessel pump (LFP-PMP-00002).

To prevent a possible overflow, the PCJ system alarms at two different high-level setpoints. At high-level setpoint, the PCJ system initiates a high alarm and alerts the operator. At high-high level setpoint, the PCJ system initiates a critical alarm and alerts the operator. Additionally, a high-high level during a procedural transfer from another vessel will initiate exception handling to mitigate vessel overfill. Figure 2 depicts the instrumentation associated with the melter 1 feed vessel (LFP-VSL-00002).

3.1.3 Melter 1 Feed/Prep Valve Bulge (LFP-BULGE-00001)

The melter 1 feed/prep valve bulge (LFP-BULGE-00001) is at the 28 ft elevation in the process cell charge floor C3 area, room L-0202. The melter 1 feed/prep valve bulge (LFP-BULGE-00001) is connected by through-floor piping to the process wet cells. The transfer pump (LFP-PMP-00001A or LFP-PMP-00001B) discharge can routinely be routed to either the melter 1 feed vessel (LFP-VSL-00002) or the melter 2 feed prep vessel (LFP-VSL-00003). Sampling capability is provided using a sampling leg off the pump discharge line to the autosampler unit (ASX-SMPLR-00012).

During off-normal operation any bulge-contained leakage will gravity drain via through-floor piping into the sump (RLD-SUMP-00030) at the 2 ft elevation in the enclosed wet process C5 cell, room L-0123.

3.1.4 Melter 2 Feed Prep Vessel (LFP-VSL-00003)

The melter 2 feed prep vessel (LFP-VSL-00003) is at the 2 ft elevation in an enclosed wet process C5 cell, room L-0124. The vessel receives any overflow from the melter 2 feed vessel (LFP-VSL-00004). The vessel overflows via overflow line to the C3/C5 drains/sump collection vessel (RLD-VSL-00004) in another cell, room L-B001B at the –21 ft elevation.

The wet process C5 cell, room L-0124, supports a stainless steel liner sized to provide secondary containment. The welded vessel, process cell secondary containment, and the overflow system meet the requirement to minimize system leaks.

The melter 2 feed prep vessel (LFP-VSL-00003) is constructed of 316 stainless steel and receives treated tank farm liquid waste from the concentrate receipt vessels (LCP-VSL-00001 or LCP-VSL-00002), also at the 2 ft elevation. During a batch process glass formers are added to the waste. If the melter 2 feed prep vessel agitator (LFP-AGT-00003) receives permissives to operate, it blends the waste to form a melter feed. The vessel is vented via a vessel ventilation header into the LVP system.

The melter 2 feed prep vessel (LFP-VSL-00003) level is continuously monitored by redundant level transmitters LFP-LT-2124 and LFP-LT-2140. The operator selects the primary transmitter. This actual level signal inputs to the functional logic and batch controls and calculates actual volume. The PCJ system monitors level to control melter feed batch transfers. As part of the batch control, the operator releases and acquires the target vessel melter 1 feed vessel (LFP-VSL-00002) or melter 2 feed vessel (LFP-VSL-00004) and initiates the transfer sequence using a melter 2 feed prep pump (LFP-PMP-00003A or LFP-PMP-00003B).

Once initiated, the PCJ system verifies that the instruments, utilities, and equipment associated with the transfer are within operational parameters. Before the sequence proceeds further, the transfer (available) volume is calculated by the PCJ system to assist the operator and verify that the volume will not overflow the selected target vessel available space. The transfer will end when either the level in the melter 2 feed prep vessel (LFP-VSL-00003) reaches its low-level functional logic control point, a batch is transferred, or the selected target vessel reaches its high-level batch control point. Low-low level trips will stop the melter 2 feed prep vessel agitator (LFP-AGT-00003) and melter 2 feed prep pump (LFP-PMP-00003A or LFP-PMP-00003B).

To prevent a possible overflow, the PCJ system alarms at two different high-level setpoints. At high-level setpoint, the PCJ system initiates a high alarm and alerts the operator. At high-high level setpoint, the PCJ system initiates a critical alarm and alerts the operator. Additionally, a high-high level during a procedural transfer from another vessel will initiate exception handling to mitigate vessel overfill. Figure 3 depicts the instrumentation associated with the melter 2 feed prep vessel (LFP-VSL-00003).

3.1.5 Melter 2 Feed Vessel (LFP-VSL-00004)

The melter 2 feed vessel (LFP-VSL-00004) is at the 2 ft elevation in an enclosed wet process C5 cell, room L-0124. The vessel overflows via an overflow header to the melter 2 feed prep vessel (LFP-VSL-00003) in the enclosed wet process C5 cell, room L-0124.

The wet process C5 cell, room L-0124, supports a stainless steel liner to provide secondary containment.

The melter 2 feed vessel (LFP-VSL-00004) is constructed of 316 stainless steel and receives a blended melter feed of treated tank farm liquid waste from the melter 1 feed prep vessel (LFP-VSL-00001) or the melter 2 feed prep vessel (LFP-VSL-00003). The vessel is vented via a vessel ventilation header into the LVP system.

The melter 2 feed vessel (LFP-VSL-00004) level is continuously monitored by redundant level transmitters LFP-LT-2145 and LFP-LT-2146. The operator selects the primary transmitter. This actual level signal inputs to the functional logic and batch controls and calculates actual volume. The PCJ system monitors level to control melter feed batch transfers. As part of the nonmelter feed batch control, the operator releases and acquires the target melter 1 feed prep vessel (LFP-VSL-00001), melter 2 feed prep vessel (LFP-VSL-00003), or plant wash vessel (RLD-VSL-00003). The transfer sequence uses melter 2 feed vessel pump (LFP-PMP-00004).

Once initiated, the PCJ system verifies that the instruments, utilities, and equipment associated with the transfer are within operational parameters. Before the nonmelter transfer sequence proceeds further, the transfer (available) volume is calculated by the PCJ system to assist the operator and verify that the volume will not overflow the selected target vessel available space. The nonmelter transfers will end when either the level in the melter 2 feed vessel (LFP-VSL-00004) reaches its low-level functional logic control point, a batch is transferred, or the selected target vessel reaches its high-level batch control point. Low-low level trips will stop the melter 2 feed vessel agitator (LFP-AGT-00004) and melter 2 feed vessel pump (LFP-PMP-00004).

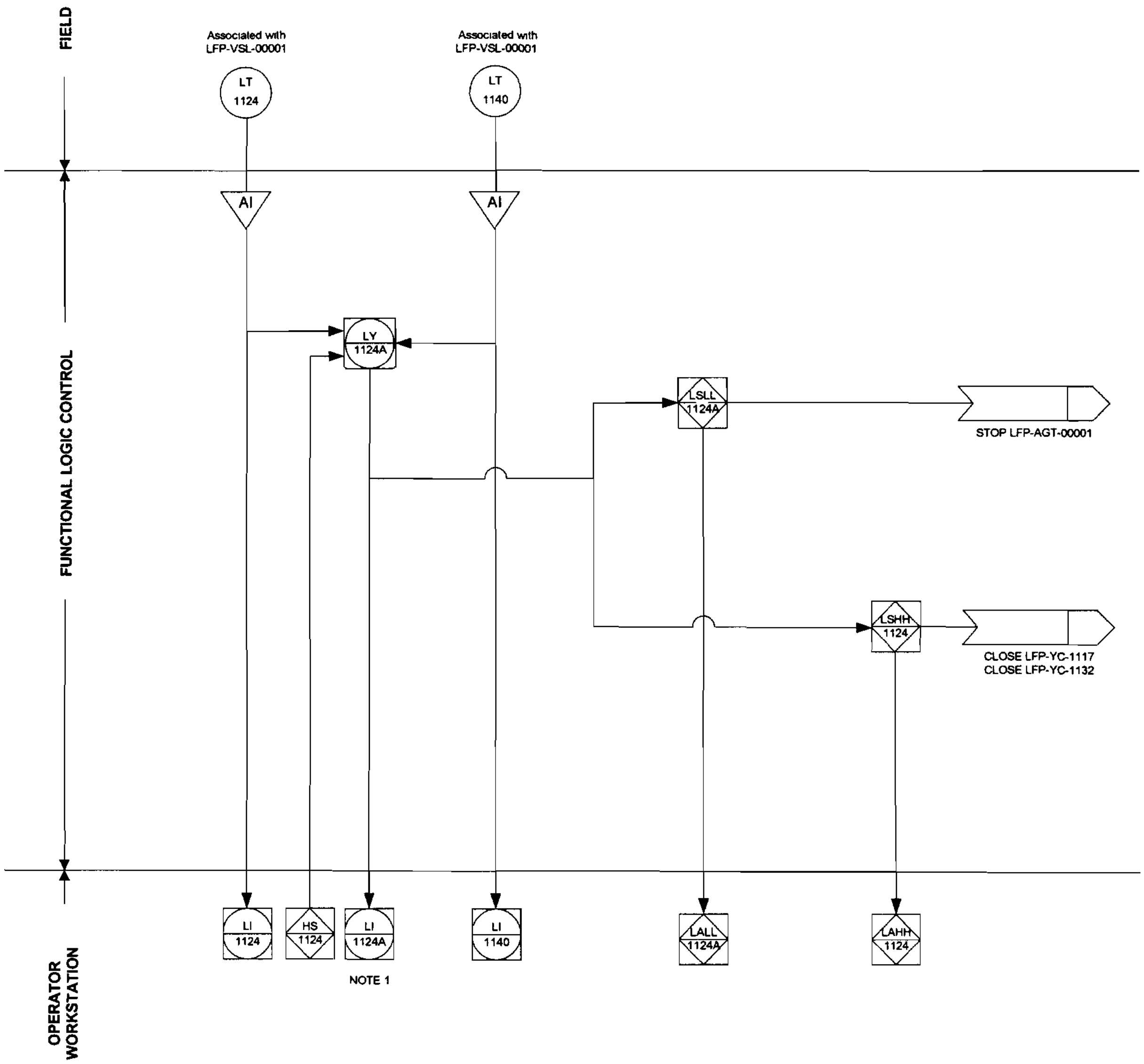
To prevent a possible overflow, the PCJ system alarms at two different high-level setpoints. At high-level setpoint, the PCJ system initiates a high alarm and alerts the operator. At high-high level setpoint, the PCJ system initiates a critical alarm alert the operator. Additionally, a high-high level during a procedural transfer from another vessel will initiate exception handling to mitigate vessel overfill. Figure 4 depicts the instrumentation associated with the melter 2 feed vessel (LFP-VSL-00004).

3.1.6 Melter 2 Feed/Prep Valve Bulge (LFP-BULGE-00002)

The melter 2 feed/prep valve bulge (LFP-BULGE-00002) is at the 28 ft elevation in the process cell charge floor C3 area, room L-0202. The melter 2 feed/prep valve bulge (LFP-BULGE-00002) is connected by through-floor piping to the process wet cells. The transfer pump (LFP-PMP-00003A or LFP-PMP-00003B) discharge can routinely be routed to either the melter 2 feed vessel (LFP-VSL-00004) or the melter 1 feed prep vessel (LFP-VSL-00001). Sampling capability is provided using a sampling leg off the pump discharge line to the autosampler unit (ASX-SMPLR-00012).

During off-normal operation any bulge-contained leakage will gravity drain via through-floor piping into the sump (RLD-SUMP-00032) located at the 2 ft elevation in the enclosed wet process C5 cell, room L-0124.

Figure 1 Level Control for Vessel LFP-VSL-00001



NOTES

1 ON HIGH-HIGH LEVEL PCJ CONTROL SYSTEM BATCH CONTROL SHALL ASSIST OPERATOR TO PREVENT VESSEL OVERFILL

Figure 2 Level Control for Vessel LFP-VSL-00002

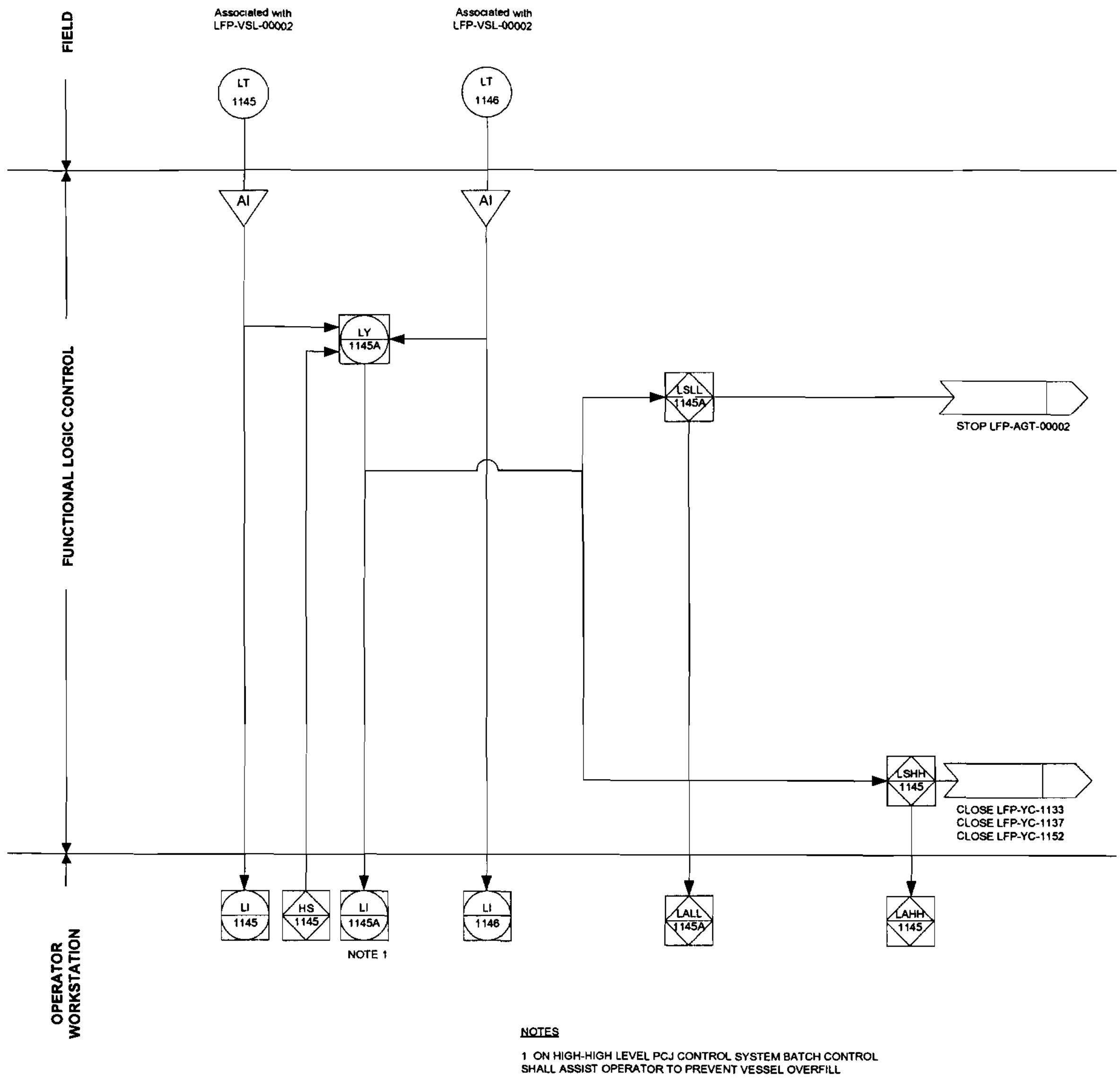
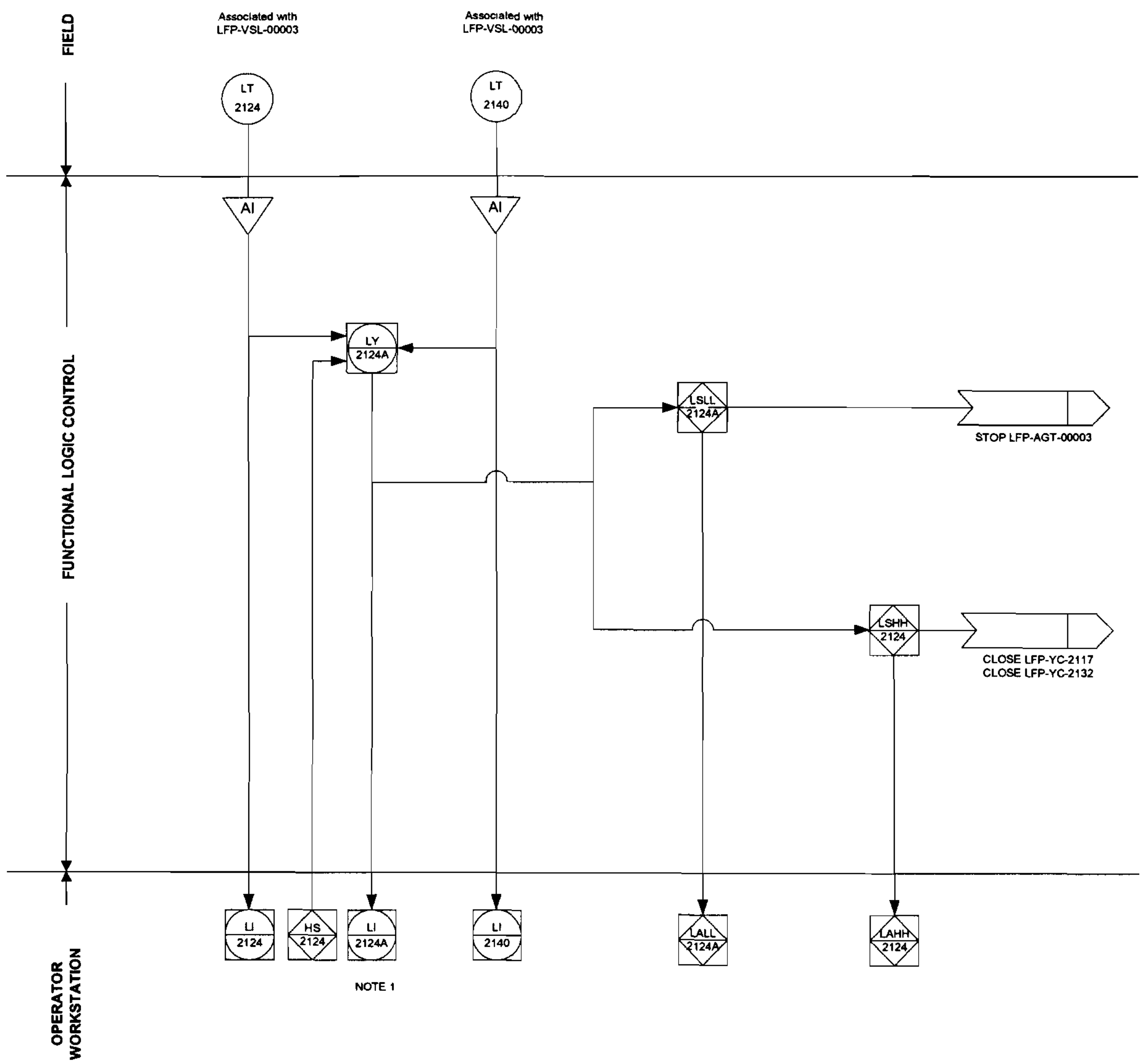


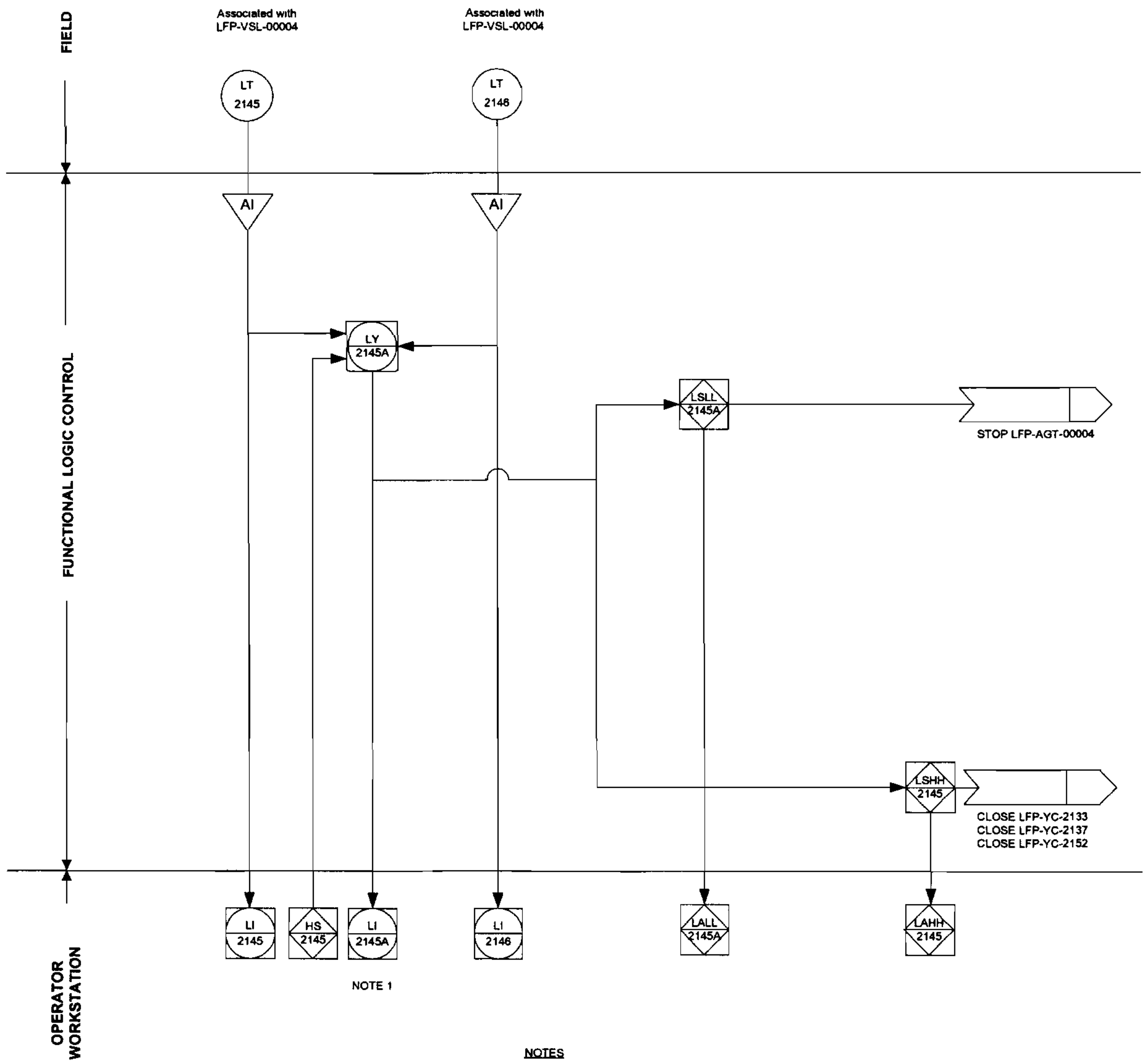
Figure 3 Level Control for Vessel LFP-VSL-00003



NOTES

1 ON HIGH-HIGH LEVEL PCJ CONTROL SYSTEM BATCH CONTROL SHALL ASSIST OPERATOR TO PREVENT VESSEL OVERFILL

Figure 4 Level Control for Vessel LFP-VSL-00004



NOTES

1 ON HIGH-HIGH LEVEL PCJ CONTROL SYSTEM BATCH CONTROL SHALL ASSIST OPERATOR TO PREVENT VESSEL OVERFILL

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History Sheet

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0	16 Apr 2004	Issued for permitting use	EL Vodopest

Contents

Figures

Glossary

Acquire	A command, under batch control, that reserves a group of equipment for that particular batch control.
Actual Volume	Volume of waste or process fluid in any vessel in gallons.
Available Space	Volume of waste or process fluid that any vessel can accommodate and still be lower than the upper operating limit (UOL), in gallons. Available space can be calculated as follows: *Available Space = UOL - Actual Volume*.
Available Volume	Volume of waste/process fluid that any vessel can transfer to another vessel and still be above the lower operating limit (LOL), in gallons. Available volume can be calculated as follows: *Available Volume = Actual Volume - LOL*.
Batch	The material that is being produced or that has been produced by a single execution of a batch process.
Batch Control	Control activities and control functions that provide a means to process (that is, an ordered set of processing activities) finite quantities of material over a finite period of time using one or more pieces of equipment.
Batch Process	A process that leads to the production of finite quantities of material by subjecting quantities of input material to an ordered set of processing activities over a finite period of time using one or more pieces of equipment.
Exception Handling	Those functions that deal with plant or process contingencies and other events that occur outside the normal or desired behavior of batch control.
Permissive	Interlock that allows a device to change state or a sequence to start. Once a device has changed state or a sequence has started, permissives have no further effect on the device or sequence.
Release	A command under a batch control that opens up a group of equipment for any batch control to acquire.
Trip	Interlock that does not allow a device to change state or a sequence to start. Once a device has changed state or a sequence has started, trips continue to have an effect on the device or sequence.

Acronyms and Abbreviations

AEA	Atomic Energy Act of 1954
DOE	US Department of Energy
HS	hand switch
LALL	level alarm low low
LAW	low-activity waste
LCP	LAW concentrate receipt process system
LI	level indicator
LSLL	level switch low low
LT	level transmitter
LVP	LAW secondary offgas/vessel vent process system
LY	level relay
PCJ	process control system
PT	pretreatment (facility)

1 Introduction

This document describes the instrument control logic for tank and ancillary equipment in the low-activity waste (LAW) facility for the LAW concentrate receipt process system (LCP) associated with dangerous waste management. This document revision focuses on tank and ancillary equipment for the LCP system above the 0 ft elevation in the LAW facility.

2 Applicable Documents

WAC 173-303, *Dangerous Waste Regulations*, Washington Administrative Code, as amended.

3 Description

3.1 System Requirement

The tank and ancillary equipment associated with dangerous waste management in the LAW system above the 0 ft elevation of the LFP system consists of the following:

- LCP-VSL-00001 concentrate receipt vessel
- LCP-VSL-00002 concentrate receipt vessel
- LCP-BULGE-00001 concentrate receipt valve bulge
- LCP-BULGE-00002 concentrate receipt valve bulge
- LCP-BULGE-00003 concentrate receipt valve bulge

3.1.1 Concentrate Receipt Vessel LCP-VSL-00001

The concentrate receipt vessel (LCP-VSL-00001) is at the 2 ft elevation in an enclosed wet process C5 cell, room L-0123. The contents of the vessel overflow via an overflow header to the C3/C5 drains/sump collection vessel (RLD-VSL-00004) in another cell, room L-B001B, at the –21 ft elevation.

The wet process C5 cell, room L-0123, supports a stainless steel liner sized to provide secondary containment. The welded vessel, process cell secondary containment, and the overflow system meet the requirement to minimize system leaks.

The concentrate receipt vessel (LCP-VSL-00001) is constructed of 316L stainless steel and receives treated Tank Farm liquid waste via coaxial lines from the treated LAW concentrate vessel (TCP-VSL-00001), at the pretreatment (PT) facility. During a batch process, when concentrate receipt vessel agitator (LCP-AGT-00001) receives permissives to operate, the vessel contents are agitated to provide a representative sample. The vessel is vented via a vessel ventilation header into the LAW secondary offgas/vessel vent process system (LVP).

The concentrate receipt vessel (LCP-VSL-00001) level is continuously monitored by redundant level transmitters LCP-LT-0131 and LCP-LT-0139. The operator selects the primary transmitter. This actual level signal inputs to the functional logic and batch controls and calculates actual volume. The process control system (PCJ) monitors the level to control melter feed batch transfers. As part of the batch control, the operator releases and acquires the target vessel, melter 1 feed prep vessel (LFP-VSL-00001) or melter 2 feed prep vessel (LFP-VSL-00003) and initiates the transfer sequence using a concentrate receipt pump (LCP-PMP-00001A or LCP-PMP-00001B).

Once initiated, the PCJ system verifies that all instruments, utilities, and equipment associated with the transfer are within operational parameters. Next, an automated process sample may be taken to document solids content and effluent characteristics. Before the sequence proceeds further, the PCJ system calculates the transfer (available) volume to assist the operator and verify that the volume will not overflow the selected target vessel available space. The transfer will end when either the level in the concentrate receipt vessel (LCP-VSL-00001) reaches its low-level functional logic control point, a batch is transferred, or the selected target vessel reaches its actual high-level batch control point. Low-low level trips will stop the concentrate receipt vessel agitator (LCP-AGT-00001) and concentrate receipt pump (LCP-PMP-00001A or LCP-PMP-00001B).

To prevent a possible overflow, the PCJ system alarms at two high-level setpoints. At high-level setpoint, the PCJ system initiates a high alarm and alerts the operator. At high-high level setpoint, the PCJ system initiates a critical alarm and alerts the operator. Additionally, a high-high level during a procedural transfer from another vessel will initiate exception handling to mitigate concentrate receipt vessel (LCP-VSL-00001) overfill. Figure 1 depicts the instrumentation associated with the concentrate receipt vessel (LCP-VSL-00001).

3.1.2 Concentrate Receipt Vessel LCP-VSL-00002

The concentrate receipt vessel (LCP-VSL-00002) is at the 2 ft elevation in an enclosed wet process C5 cell, room L-0124. The contents of the vessel overflow via an overflow header to the C3/C5 drains/sump collection vessel (RLD-VSL-00004) in another cell, room L-B001B, at the –21 ft elevation.

The wet process C5 cell, room L-0124, supports a stainless steel liner sized to provide secondary containment. The welded vessel, process cell secondary containment, and the overflow system meet the requirement to minimize system leaks.

The concentrate receipt vessel (LCP-VSL-00002) is constructed of 316L stainless steel and receives treated Tank Farm liquid waste via coaxial lines from the treated LAW concentrate vessel (TCP-VSL-00001), at the PT facility. During a batch process, when concentrate receipt vessel agitator (LCP-AGT-00002) receives permissives to operate, the vessel contents are agitated to provide a representative sample. The vessel is vented via a vessel ventilation header into the LVP system.

The concentrate receipt vessel (LCP-VSL-00002) level is continuously monitored by redundant level transmitters LCP-LT-0233 and LCP-LT-0252. The operator selects the primary transmitter. This actual level signal inputs to the functional logic and batch controls and calculates actual volume. The PCJ system monitors the level to control melter feed batch transfers. As part of the batch control, the operator releases and acquires the target vessel, melter 1 feed prep vessel (LFP-VSL-00001) or melter 2 feed prep vessel (LFP-VSL-00003) and initiates the transfer sequence using a concentrate receipt pump (LCP-PMP-00002A or LCP-PMP-00002B).

Once initiated, the PCJ system verifies that all instruments, utilities, and equipment associated with the transfer are within operational parameters. Next, an automated process sample may be taken to document solids content and effluent characteristics. Before the sequence proceeds further, the PCJ system calculates transfer (available) volume to assist the operator and verify that the volume will not overflow the selected target vessel available space. The transfer will end when either the level in the concentrate receipt vessel (LCP-VSL-00002) reaches its low-level functional logic control point, a batch is transferred, or the selected target vessel reaches its actual high-level batch control point. Low-low level trips will stop the concentrate receipt vessel agitator (LCP-AGT-00002) and concentrate receipt pump (LCP-PMP-00002A or LCP-PMP-00002B).

To prevent a possible overflow, the PCJ system alarms at two high-level setpoints. At high-level setpoint, the PCJ system initiates a high alarm and alerts the operator. At high-high level setpoint, the PCJ system initiates a critical alarm and alerts the operator. Additionally, a high-high level during a procedural transfer from another vessel will initiate exception handling to mitigate concentrate receipt vessel (LCP-VSL-00002) overfill. Figure 2 depicts the instrumentation associated with the concentrate receipt vessel (LCP-VSL-00002).

3.1.3 Concentrate Receipt Valve Bulge LCP-BULGE-00001

The concentrate receipt valve bulge (LCP-BULGE-00001) is at the 28 ft elevation in the process cell charge floor C3 area, room L-0202. Treated Tank Farm liquid waste is received via coaxial lines from the treated LAW concentrate vessel (TCP-VSL-00001), at the PT facility, then enters the C3/C5 drain collection cell room L-B001B at the –21 ft elevation, continues to pour cave cooling room L-B030 at the –21 ft elevation, passes up to wet process C5 cell room L-0123, and then continues as single-wall lines up to the concentrate receipt valve bulge (LCP-BULGE-00001), at the 28 ft elevation. The concentrate receipt valve bulge (LCP-BULGE-00001) is then connected by through-floor piping back down to process wet cell concentrate receipt vessels (LCP-VSL-00001 and LCP-VSL-00002).

During off-normal operation any bulge drain volume contents will overflow via through-floor piping into the sump (RLD-SUMP-00029) at the 2 ft elevation in the enclosed wet process C5 cell, room L-0123.

3.1.4 Concentrate Receipt Valve Bulge LCP-BULGE-00002

The concentrate receipt valve bulge (LCP-BULGE-00002) is at the 28 ft elevation in the process cell charge floor C3 area, room L-0202. The concentrate receipt valve bulge (LCP-BULGE-00002) is connected by through-floor piping to the process wet cells. The transfer pump (LCP-PMP-00001A or LCP-PMP-00001B) discharge can routinely be routed to either the melter 1 feed prep vessel (LFP-VSL-00001) or the melter 2 feed prep vessel (LFP-VSL-00003). Sampling is provided using a sampling leg off the pump discharge line to the autosampler unit (ASX-SMPLR-00013).

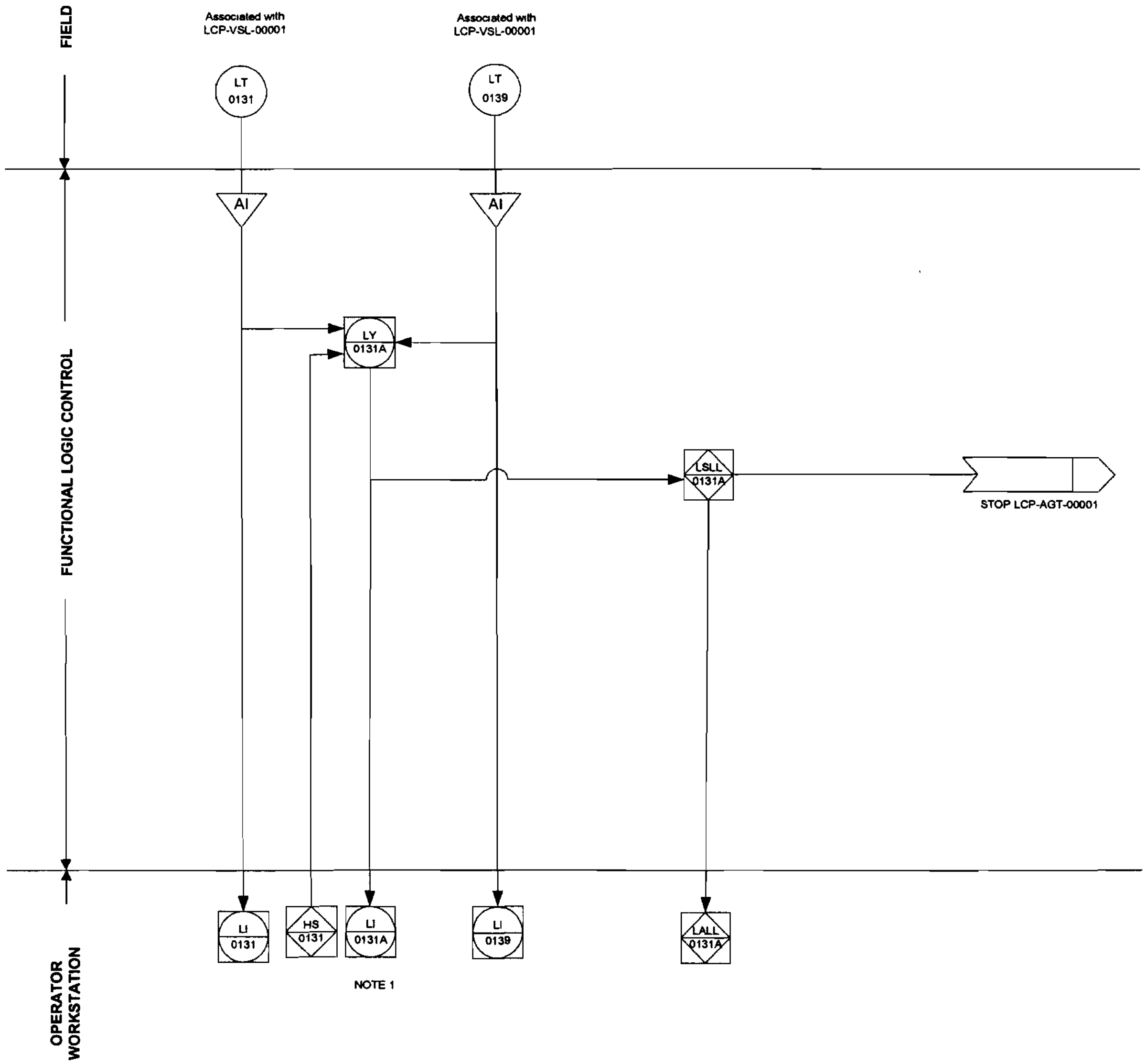
During off-normal operation any bulge drain volume contents will overflow via through-floor piping into the sump (RLD-SUMP-00029), at the 2 ft elevation in the enclosed wet process C5 cell, room L-0123.

3.1.5 Concentrate Receipt Valve Bulge LCP-BULGE-00003

The concentrate receipt valve bulge (LCP-BULGE-00003) is at the 28 ft elevation in the process cell charge floor C3 area, room L-0202. The concentrate receipt valve bulge (LCP-BULGE-00003) is connected by through-floor piping to the process wet cells. The transfer pump (LCP-PMP-00002A or LCP-PMP-00002B) discharge can routinely be routed to either the melter 1 feed prep vessel (LFP-VSL-00001) or the melter 2 feed prep vessel (LFP-VSL-00003). Sampling is provided using a sampling leg off the pump discharge line to the autosampler unit (ASX-SMPLR-00013).

During off-normal operation any bulge drain volume contents will overflow via through-floor piping into the sump (RLD-SUMP-00032), at the 2 ft elevation in the enclosed wet process C5 cell, room L-0124.

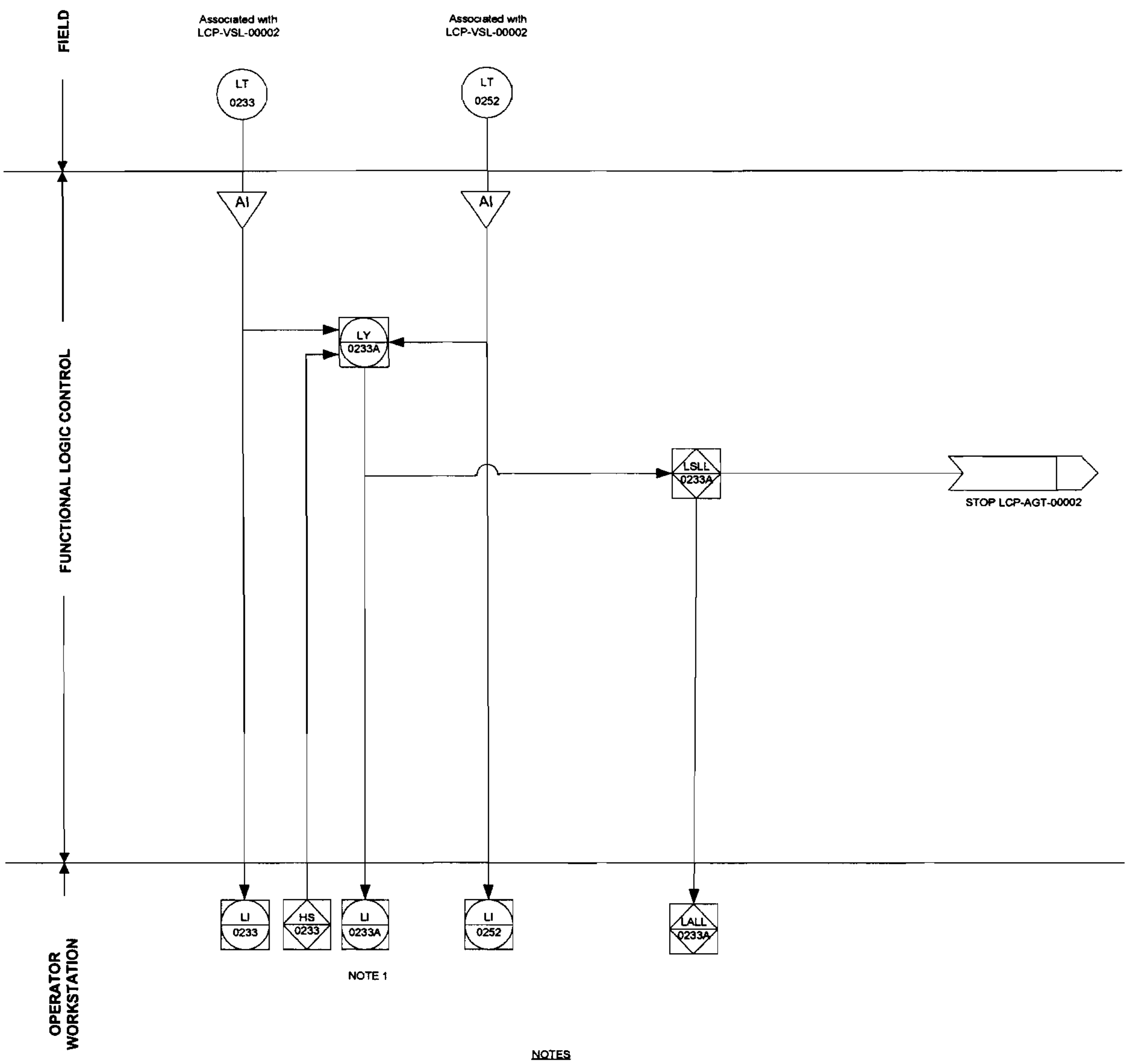
Figure 1 Level Control for Vessel LCP-VSL-00001



NOTES

1 ON HIGH-HIGH LEVEL PCJ CONTROL SYSTEM BATCH CONTROL SHALL ASSIST OPERATOR TO PREVENT VESSEL OVERFILL

Figure 2 Level Control for Vessel LCP-VSL-00002



NOTES

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Notice

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History Sheet

Rev	Date	Reason for revision	Revised by
0	4 May 2004	Issued for Permitting Use	EL Vodopest

Contents

Figures

Glossary

Acquire	A command, under batch control, that reserves a group of equipment for that particular batch control.
Actual Volume	Volume of waste/process fluid in any vessel in gallons.
Available Space	Volume of waste/process fluid that any vessel can accommodate and still be lower than the upper operating limit (UOL), in gallons. Available space can be calculated as follows: *Available Space = UOL - Actual Volume.*
Available Volume	Volume of waste/process fluid that any vessel can transfer to another vessel and still be above the lower operating limit (LOL), in gallons. Available volume can be calculated as follows: *Available Volume = Actual Volume - LOL.*
Batch	The material that is being produced or that has been produced by a single execution of a batch process.
Batch Control	Control activities and control functions that provide a means to process (that is, an ordered set of processing activities) finite quantities of material over a finite period of time using one or more pieces of equipment.
Batch Process	A process that leads to the production of finite quantities of material by subjecting quantities of input material to an ordered set of processing activities over a finite period of time using one or more pieces of equipment.
Exception Handling	Those functions that deal with plant or process contingencies and other events that occur outside the normal or desired behavior of batch control.
Permissive	Interlock that allows a device to change state or a sequence to start. Once a device has changed state or a sequence has started, permissives have no further effect on the device or sequence.
Release	A command under a batch control that opens up a group of equipment for any batch control to acquire.
Trip	Interlock that does not allow a device to change state or a sequence to start. Once a device has changed state or a sequence has started, trips continue to have an effect on the device or sequence.

Acronyms and Abbreviations

AEA	Atomic Energy Act of 1954
DOE	US Department of Energy
LAHH	level alarm high high
LALL	level alarm low low
LAW	low-activity waste
LI	level indicator
LOP	LAW primary offgas system
LSHH	level switch high high
LSLL	level switch low low
LT	level transmitter
LY	level relay
PCJ	process control system
PPJ	programmable protection system
RLD	radioactive liquid waste disposal system
SBS	submerged bed scrubber
WESP	wet electrostatic precipitator

1 Introduction

This document describes the instrument control logic for regulated plant items and associated ancillary equipment within the low-activity waste (LAW) facility for the LAW primary offgas (LOP) system associated with dangerous waste management. This document focuses on tank and ancillary equipment for the LOP system above the 0 ft elevation within the LAW facility.

2 Applicable Documents

WAC 173-303, *Dangerous Waste Regulations*, Washington Administrative Code, as amended.

3 Description

The plant items and ancillary equipment associated with dangerous waste management in the LAW system and the LOP system consists of the following:

• LOP-BULGE-00001	Melter 1 Valve Bulge
• LOP-BULGE-00002	Melter 2 Valve Bulge
• LOP-FCLR-00001	Melter 1 Primary Offgas Film Cooler
• LOP-FCLR-00002	Melter 1 Standby Offgas Film Cooler
• LOP-FCLR-00003	Melter 2 Primary Offgas Film Cooler
• LOP-FCLR-00004	Melter 2 Standby Offgas Film Cooler
• LOP-SCB-00001	Melter 1 SBS
• LOP-SCB-00002	Melter 2 SBS
• LOP-VSL-00001	Melter 1 SBS Condensate Vessel
• LOP-VSL-00002	Melter 2 SBS Condensate Vessel
• LOP-WESP-00001	Melter 1 WESP
• LOP-WESP-00002	Melter 2 WESP

3.1 Melter 1 Submerged Bed Scrubber LOP-SCB-00001 and Melter 1 SBS Condensate Vessel LOP-VSL-00001

The melter 1 submerged bed scrubber (SBS) (LOP-SCB-00001) is at the 2 ft elevation in an enclosed wet process C5 cell, room L-0123. Offgas passes from the melter to the melter 1 primary offgas film cooler (LOP-FCLR-00001) or melter 1 standby offgas film cooler (LOP-FCLR-00002) to the melter 1 SBS (LOP-SCB-00001) for aqueous scrubbing of entrained radioactive particulate from melter offgas plus cooling and condensation of melter vapor emissions. Melter 1 SBS (LOP-SCB-00001) is constructed of alloy C-22.

The scrubbed offgas discharges through the top of the SBS, through a series of equipment to a process stack. As the offgas cools, water vapor condenses and increases the liquid inventory in the SBS. A constant liquid depth is maintained in the melter 1 SBS (LOP-SCB-00001) as excess liquid overflows into the melter 1 SBS condensate vessel (LOP-VSL-00001), also at the 2 ft elevation in the enclosed wet process C5 cell, room L-0123. Melter 1 SBS (LOP-SCB-00001) level is continuously monitored by redundant level transmitters LOP-LT-1011 and LOP-LT-1063. Melter 1 SBS water purge pump, primary/standby (LOP-PMP-00003A/3B) for the SBS, transfers condensate to the SBS condensate collection vessel (RLD-VSL-00005) at the 2 ft elevation in an enclosed effluent C5 cell, room L-0126.

Liquid from the melter 1 SBS condensate vessel (LOP-VSL-00001) is recycled to the SBS at a rate higher than condensate is removed. The melter 1 SBS condensate vessel (LOP-VSL-00001) is constructed of alloy C-22. The melter 1 SBS condensate vessel (LOP-VSL-00001) is vented back to the melter 1 SBS (LOP-SCB-00001). Melter 1 SBS condensate vessel (LOP-VSL-00001) level is continuously monitored by level transmitter LOP-LT-1018. To help remove solids, the melter 1 SBS condensate purge pumps (LOP-PMP-00001/2) recirculate condensate through lances that agitate the bottom of the SBS and consolidate the solids near the pump suction. To suspend the solids in the melter 1 SBS condensate vessel (LOP-VSL-00001), the melter 1 SBS condensate mixing eductor (LOP-EDUC-00001) is used, using a side stream from the recirculation line.

For the melter 1 SBS (LOP-SCB-00001) at a predetermined setpoint, the programmable protection system (PPJ) notifies the operator via the process control system (PCJ) that liquid level has risen to a point where purge is required. The operator then selects the target vessel and initiates the transfer sequence. Once initiated, the PCJ verifies that all instruments, utilities, and equipment associated with the transfer are within operational parameters. At high-high level setpoint, the PCJ system initiates a critical alarm and alerts the operator. The transfer will end when either the level in the melter 1 SBS (LOP-SCB-00001) reaches its low-level control point, or the selected target vessel reaches its high-level control point, or sooner as determined by the operator. Figure 1 depicts the instrumentation associated with the melter 1 SBS (LOP-SCB-00001).

For the melter 1 SBS condensate vessel (LOP-VSL-00001), the PCJ system alarms at high-level setpoint, and alerts the operator. Figure 2 depicts the instrumentation associated with the melter 1 SBS condensate vessel (LOP-VSL-00001).

3.2 Melter 1 Valve Bulge LOP-BULGE-00001

The melter 1 valve bulge (LOP-BULGE-00001) is at the 28 ft elevation in the process cell charge floor C3 area, room L-0202. The melter 1 valve bulge (LOP-BULGE-00001) is connected by through-floor piping back down to the melter 1 SBS (LOP-SCB-00001), SBS condensate collection vessel (RLD-VSL-00005), and melter 1 SBS condensate vessel (LOP-VSL-00001).

The melter 1 SBS (LOP-SCB-00001) is connected to the melter 1 SBS water purge pumps -primary/standby (LOP-PMP-00003A/3B) at a platform at approximately 14 ft elevation, also in the enclosed wet process C5 cell, room L-0123, connected by through-wall piping to the melter 1 valve bulge (LOP-BULGE-00001), which is connected to the SBS condensate collection vessel (RLD-VSL-00005).

The melter 1 SBS condensate vessel (LOP-VSL-00001) is connected by through-wall piping to the melter 1 valve bulge (LOP-BULGE-00001), which sidestreams to melter 1 SBS (LOP-SCB-00001) or simply recirculates back to melter 1 SBS condensate vessel (LOP-VSL-00001).

During off-normal operation, any bulge drain volume contents will overflow via through-floor piping into the L-0123 process cell waste disposal west sump (RLD-SUMP-00029), at the 2 ft elevation in the enclosed effluent cell, room L-0123.

3.3 Melter 1 Wet Electrostatic Precipitator LOP-WESP-00001

The melter 1 wet electrostatic precipitator (WESP) (LOP-WESP-00001) is at the 2 ft elevation in an enclosed wet process C5 cell, room L-0123. The melter 1 WESP (LOP-WESP-00001) is constructed of 6 % molybdenum stainless steel. After initial aerosol and soluble gas removal in the SBS, the cooled offgas is routed to the melter 1 WESP (LOP-WESP-00001) for further removal of aerosols. The saturated gas flows upward through the tubes of the WESP. The inlet is also provided with an inlet misting to enhance rundown and cleaning. The condensate then gravity drains into the C3/C5 drains/sump collection vessel (RLD-VSL-00004). At high-high level setpoint, the PCJ system initiates a critical alarm and alerts the operator. Figure 3 depicts the instrumentation associated with the melter 1 WESP (LOP-WESP-00001).

3.4 Melter 2 SBS LOP-SCB-00002 and Melter 2 SBS Condensate Vessel LOP-VSL-00002

The melter 2 SBS (LOP-SCB-00001) is at the 2 ft elevation in an enclosed wet process C5 cell, room L-0124. Offgas passes from the melter to the melter 2 primary offgas film cooler (LOP-FCLR-00003) or melter 2 standby offgas film cooler (LOP-FCLR-00004) to the melter 2 SBS (LOP-SCB-00002) for aqueous scrubbing of entrained radioactive particulate from melter offgas plus cooling and condensation of melter vapor emissions. The melter 2 SBS (LOP-SCB-00002) is constructed of alloy C-22.

The scrubbed offgas discharges through the top of the SBS, through a series of equipment to a process stack. As the offgas cools, water vapor condenses and increases the liquid inventory. A constant liquid depth is maintained in the melter 2 SBS (LOP-SCB-00002) as excess liquid overflows into the melter 2 SBS condensate vessel (LOP-VSL-00002), also at the 2 ft elevation in the enclosed wet process C5 cell, room L-0124. The melter 2 SBS (LOP-SCB-00002) level is continuously monitored by redundant level transmitters LOP-LT-2011 and LOP-LT-2063. The melter 2 SBS water purge pump - primary (LOP-PMP-00006A) for the SBS transfers condensate to the SBS condensate collection vessel (RLD-VSL-00005) at the 2 ft elevation in an enclosed effluent C5 cell, room L-0126.

Liquid from the melter 2 SBS condensate vessel (LOP-VSL-00002) is recycled to the SBS at a rate higher than condensate is removed. The melter 2 SBS condensate vessel (LOP-VSL-00002) is constructed of alloy C-22. The melter 2 SBS condensate vessel (LOP-VSL-00002) level is continuously monitored by level transmitter LOP-LT-2018. To help remove solids, the melter 2 SBS condensate purge pumps (LOP-PMP-00003/4) recirculate condensate through lances that agitate the bottom of the SBS and consolidate the solids near the pump suction. To suspend the solids in the melter 2 SBS condensate vessel (LOP-VSL-00002), the melter 2 SBS condensate mixing eductor (LOP-EDUC-00002) is used, using a side stream from the recirculation line.

For the melter 2 SBS (LOP-SCB-00002) at a predetermined setpoint, the PPJ notifies the operator via the PCJ that liquid level has risen to a point where purge is required. The operator then selects the target vessel and initiates the transfer sequence. Once initiated, the PCJ verifies that all instruments, utilities, and equipment associated with the transfer are within operational parameters. At high-high level setpoint, the PCJ system initiates a critical alarm and alerts the operator. The transfer will end when either the level in the melter 2 SBS (LOP-SCB-00002) reaches its low-level control point or the selected target vessel reaches its high-level control point. Figure 4 depicts the instrumentation associated with the melter 2 SBS (LOP-SCB-00002).

For the melter 2 SBS condensate vessel (LOP-VSL-00002), the PCJ system alarms at high-level setpoint, and alerts the operator. Figure 5 depicts the instrumentation associated with the melter 2 SBS condensate vessel (LOP-VSL-00002).

3.5 Melter 2 Valve Bulge LOP-BULGE-00002

The melter 2 valve bulge (LOP-BULGE-00002) is at the 28 ft elevation in the process cell charge floor C3 area, room L-0202. The melter 2 valve bulge (LOP-BULGE-00002) is connected by through-floor piping back down to melter 2 SBS (LOP-SCB-00002), SBS condensate collection vessel (RLD-VSL-00005), and melter 2 SBS condensate vessel (LOP-VSL-00002).

The melter 2 SBS (LOP-SCB-00002) is connected to the melter 2 SBS water purge pumps -primary/standby (LOP-PMP-00006A/6B) at a platform at approximately 14 ft elevation, also in the enclosed wet process C5 cell, room L-0124, which is connected by through-wall piping to the melter 2 valve bulge (LOP-BULGE-00002), which is connected to the SBS condensate collection vessel (RLD-VSL-00005).

The melter 2 SBS condensate vessel (LOP-VSL-00002) is connected by through-wall piping to the melter 2 valve bulge (LOP-BULGE-00002), which sidestreams to melter 2 SBS (LOP-SCB-00002) or simply recirculates back to melter 2 SBS condensate vessel (LOP-VSL-00002).

During off-normal operation, any bulge drain volume contents will overflow via through-floor piping into the L-0124 process cell waste disposal west sump (RLD-SUMP-00031), at the 2 ft elevation in the enclosed effluent cell, room L-0124.

3.6 Melter 2 Wet Electrostatic Precipitator LOP-WESP-00002

The melter 2 WESP (LOP-WESP-00002) is at the 2 ft elevation in an enclosed wet process C5 cell, room L-0124. The melter 2 WESP (LOP-WESP-00002) is constructed of 6 % molybdenum stainless steel. After initial aerosol and soluble gas removal in the SBS, the cooled offgas is routed to the melter 2 WESP (LOP-WESP-00002) for further removal of aerosols. The saturated gas flows upward through the tubes of the WESP. The inlet is also provided with an inlet misting to enhance rundown and cleaning. The condensate then gravity drains into the C3/C5 drains/sump collection vessel (RLD-VSL-00004). Figure 6 depicts the instrumentation associated with the melter 2 WESP (LOP-WESP-00002).

Figure 1 LOP-LT-1011Z and LOP-LT-1063Z for LOP-SCB-00001

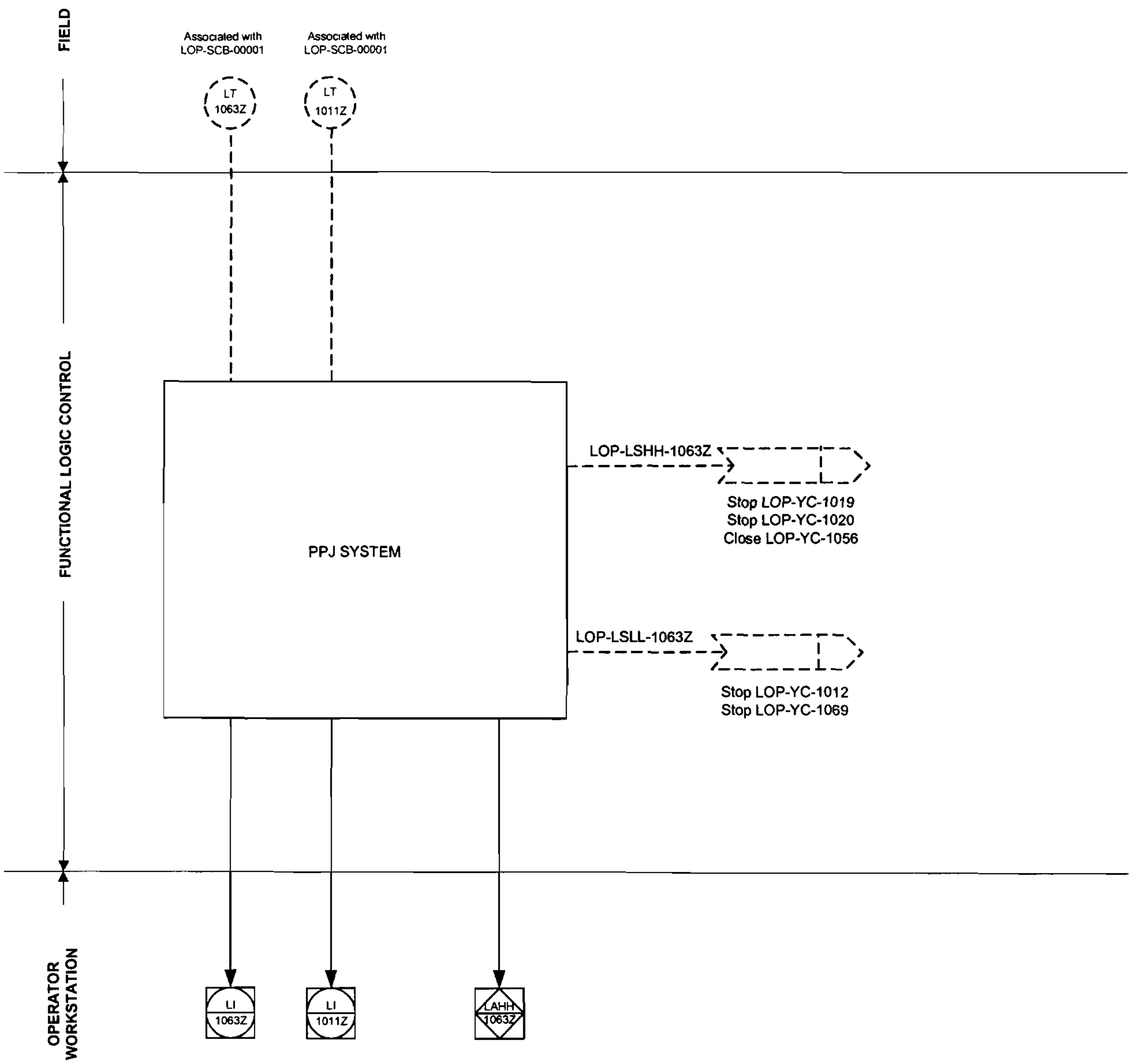


Figure 2 LOP-LT-1018 for LOP-VSL-00001

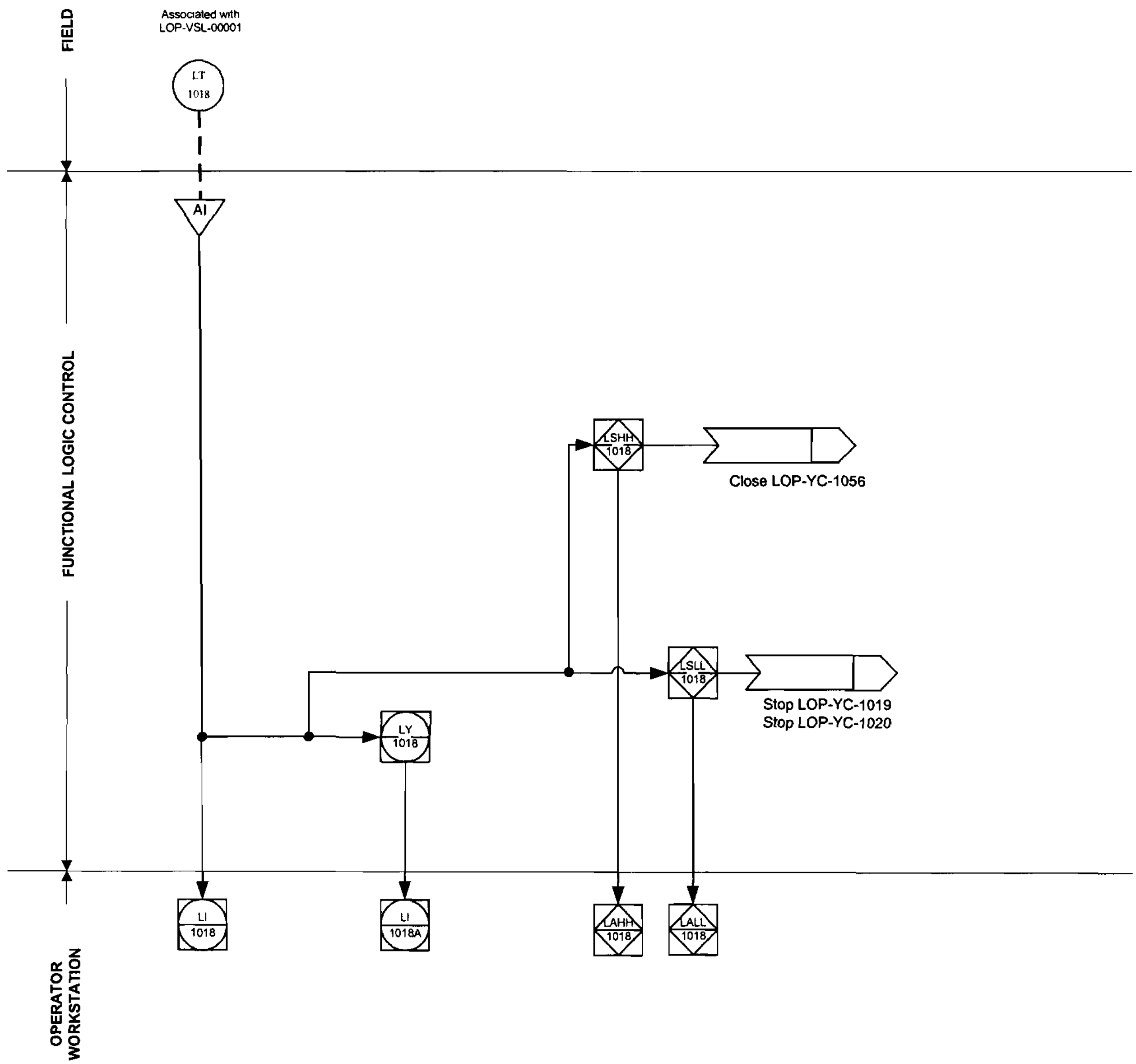


Figure 3 LOP-LT-1059Z and LOP-LT-1060Z for LOP-WESP-00001

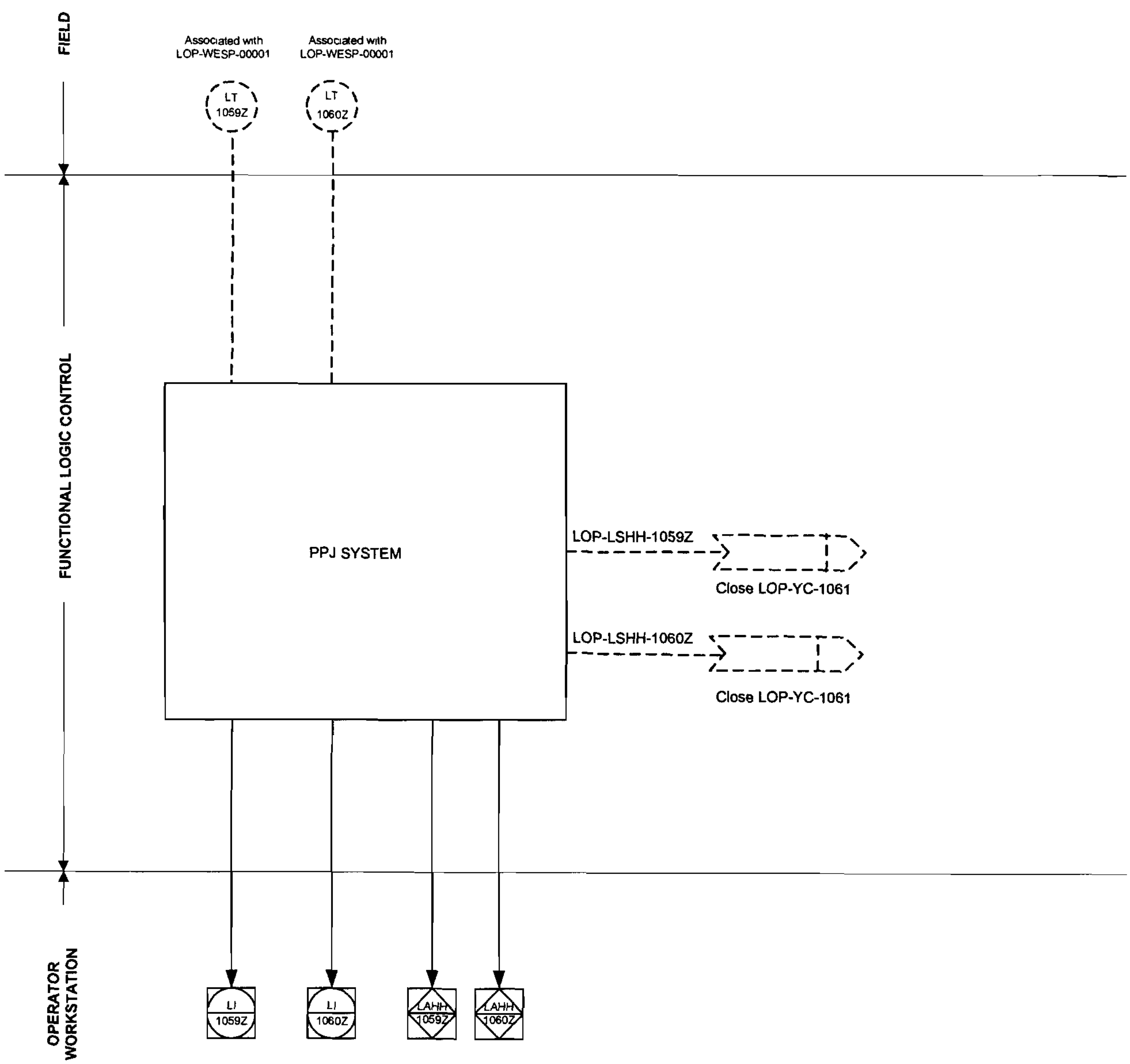


Figure 4 LOP-LT-2011Z and LOP-LT-2063Z for LOP-SCB-00002

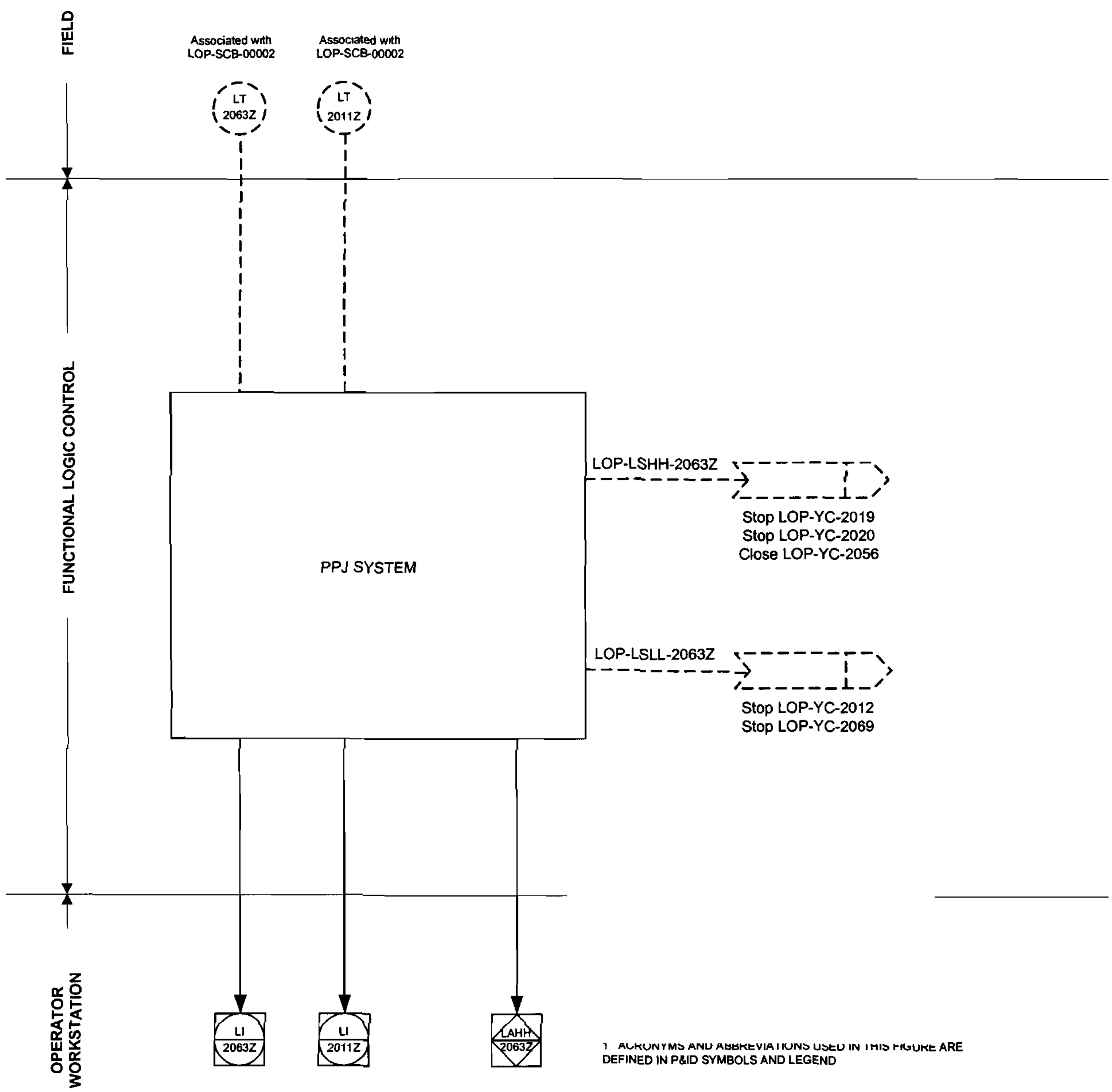


Figure 5 LOP-LT-2018 for LOP-VSL-00002

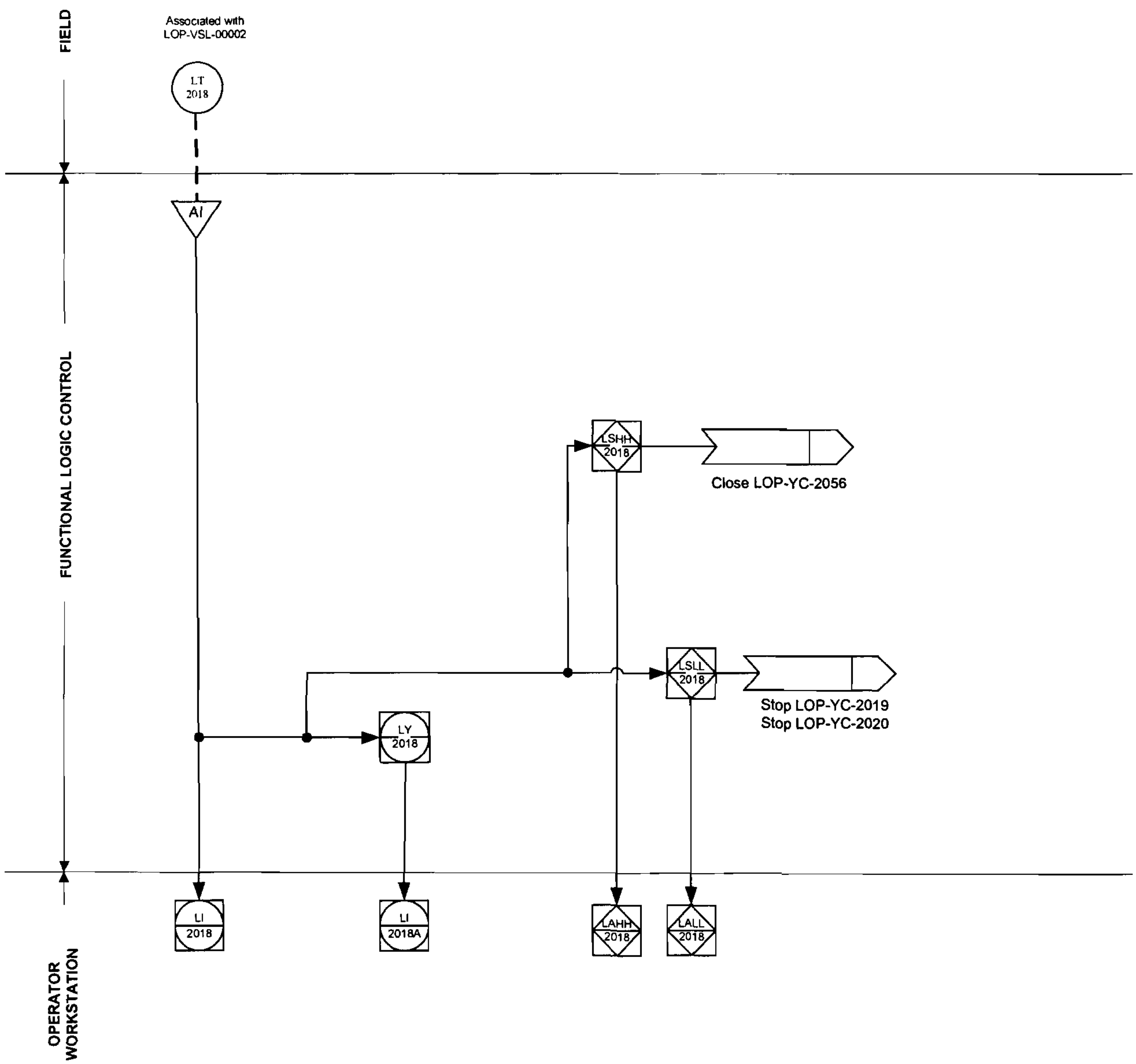
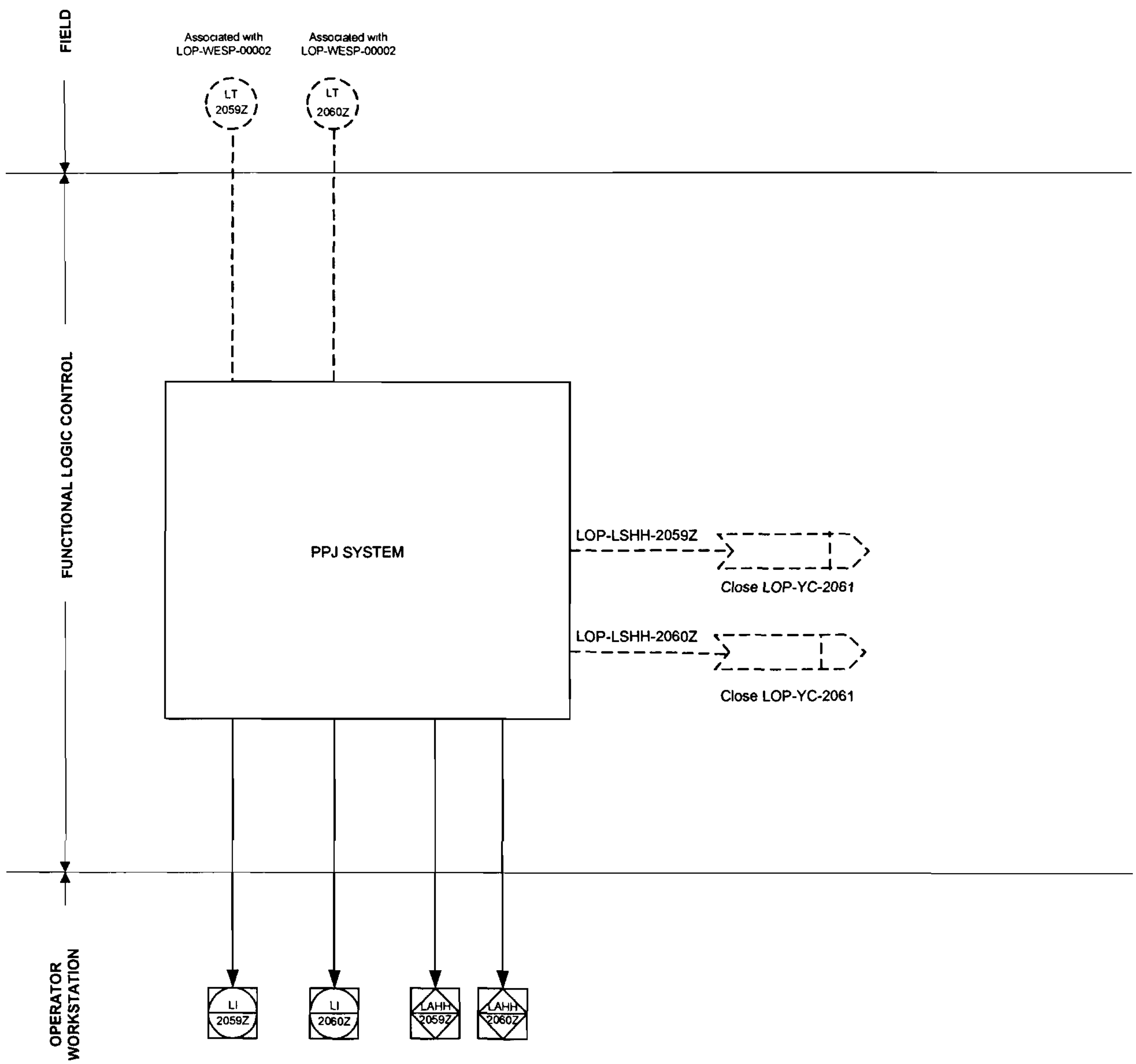


Figure 6 LOP-LT-2059Z and LOP-LT-2060Z for LOP-WESP-00002



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Document title: **System Logic Description for the Low-Activity Waste Facility – LAW Secondary Offgas (LVP) System**

Contract number: DE-AC27-01RV14136

Department: Controls and Instrumentation

Author(s): EL Vodopest

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Approver's position: C&I Engineering Manager

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Please note that source, special nuclear, and byproduct materials, as defined in the Atomic Energy Act of 1954 (AEA), are regulated at the US Department of Energy (DOE) facilities exclusively by DOE acting pursuant to its AEA authority. DOE asserts that, pursuant to the AEA, it has sole and exclusive responsibility and authority to regulate source, special nuclear, and byproduct materials at DOE-owned nuclear facilities. Information contained herein on radionuclides is provided for process description purposes only.

History Sheet

Rev	Date	Reason for revision	Revised by
0	15 November 2004	Issued to Project	EL Vodopest

Contents

Figures

Glossary

Acquire	A command, under batch control, that reserves a group of equipment for that particular batch control.
Actual Volume	Volume of waste/process fluid in any vessel in gallons.
Available Space	Volume of waste/process fluid that any vessel can accommodate and still be lower than the upper operating limit (UOL), in gallons. Available space can be calculated as follows: *Available Space = UOL - Actual Volume.*
Available Volume	Volume of waste/process fluid that any vessel can transfer to another vessel and still be above the lower operating limit (LOL), in gallons. Available volume can be calculated as follows: *Available Volume = Actual Volume - LOL.*
Batch	The material that is being produced or that has been produced by a single execution of a batch process.
Batch Control	Control activities and control functions that provide a means to process (that is, an ordered set of processing activities) finite quantities of material over a finite period of time using one or more pieces of equipment.
Batch Process	A process that leads to the production of finite quantities of material by subjecting quantities of input material to an ordered set of processing activities over a finite period of time using one or more pieces of equipment.
Exception Handling	Those functions that deal with plant or process contingencies and other events that occur outside the normal or desired behavior of batch control.
Permissive	Interlock that allows a device to change state or a sequence to start. Once a device has changed state or a sequence has started, permissives have no further effect on the device or sequence.
Release	A command under a batch control that opens up a group of equipment for any batch control to acquire.
Trip	Interlock that does not allow a device to change state or a sequence to start. Once a device has changed state or a sequence has started, trips continue to have an effect on the device or sequence.

Acronyms and Abbreviations

AEA	Atomic Energy Act of 1954
AI	analog input
DOE	US Department of Energy
DC	density controller
DT	density transmitter
FT	flow transmitter
HEPA	high efficiency particulate air filter
LAHH	level alarm high high
LALL	level alarm low low
LAW	low-activity waste
LI	level indicator
LSHH	level switch high high
LSLL	level switch low low
LT	level transmitter
LVP	LAW secondary offgas system
LY	level relay
PCJ	process control system
PMP	pump
PSW	process service water system
RLD	radioactive liquid waste disposal system
SCB	scrubber
SDJ	stack discharge monitoring system
TK	tank
VSL	vessel

1 Introduction

This document describes the instrument control logic for regulated plant items and associated ancillary equipment in the low-activity waste (LAW) facility for the LAW secondary offgas (LVP) system associated with dangerous waste management. This document focuses on tank and ancillary equipment for the LVP system for the melters offgas caustic scrubber located at the +48ft elevation in the LAW facility and the caustic collection tank located at the +28ft elevation in the LAW facility. The melter offgas HEPA filters will be included later.

2 Applicable Documents

WAC 173-303, *Dangerous Waste Regulations*, Washington Administrative Code, as amended.

3 Description

The plant items and ancillary equipment associated with dangerous waste management in the LAW system and the LVP system consist of the following:

- LVP-SCB-00001 Melters offgas caustic scrubber
- LVP-TK-00001 Caustic collection tank

The LAW primary melter offgas system (combined melter 1 and melter 2 offgas streams and selected vessel vents) passes through to the LVP system for further treatment.

3.1 Melters Offgas Caustic Scrubber LVP-SCB-00001

The melters offgas caustic scrubber (LVP-SCB-00001) is at the 48 ft elevation in the secondary offgas equipment room L-0304F. The melters offgas caustic scrubber (LVP-SCB-00001) treats the stream for acid gases such as SO_x and CO_2.

The stream flows countercurrent to the scrubbing liquid fed via offgas caustic scrubber recirculation pumps (LVP-PMP-00001A/B) at the 28 ft elevation in the caustic scrubber blowdown pump room L-0218. Contaminants in the stream are absorbed into the scrubbing liquid. The scrubbing liquid gravity drains into the caustic collection tank (LVP-TK-00001). High level is interlocked to bypass the melters offgas caustic scrubber (LVP-SCB-00001) and stop offgas caustic scrubber recirculation pumps (LVP-PMP-00001A/B).

Liquid level accumulation during normal operations is not expected. For the melters offgas caustic scrubber (LVP-SCB-00001), the PCJ system alarms at high-high level setpoint, and alerts the operator. Figure 1 depicts the instrumentation associated with the melters offgas caustic scrubber (LVP-SCB-00001).

3.2 Caustic Collection Tank LVP-TK-00001

The caustic collection tank (LVP-TK-00001) is at the 28 ft elevation in the caustic scrubber blowdown pump room L-0218 and accumulates caustic scrubbing liquid. The scrubbing liquid is fed to the melters offgas caustic scrubber (LVP-SCB-00001). The caustic blowdown transfer pumps (LVP-PMP-00002A/B) routinely pump the waste to the LAW pretreatment facility alkaline effluent vessel (RLD-VSL-00017A/B). Low level stops the offgas caustic scrubber recirculation pumps (LVP-PMP-00001A/B) and caustic blowdown transfer pumps (LVP-PMP-00002A/B).

During off-normal operation, any tank volume contents will overflow into the caustic scrubber blowdown pump room L-0218 berm. The condensate then gravity drains into the plant wash vessel (RLD-VSL-00003).

At high-high level setpoint, the PCJ system initiates an alarm and alerts the operator. Figure 2 depicts the instrumentation associated with the caustic collection tank (LVP-TK-00001).

Figure 1 LVP-LT-0090 for LVP-SCB-00001

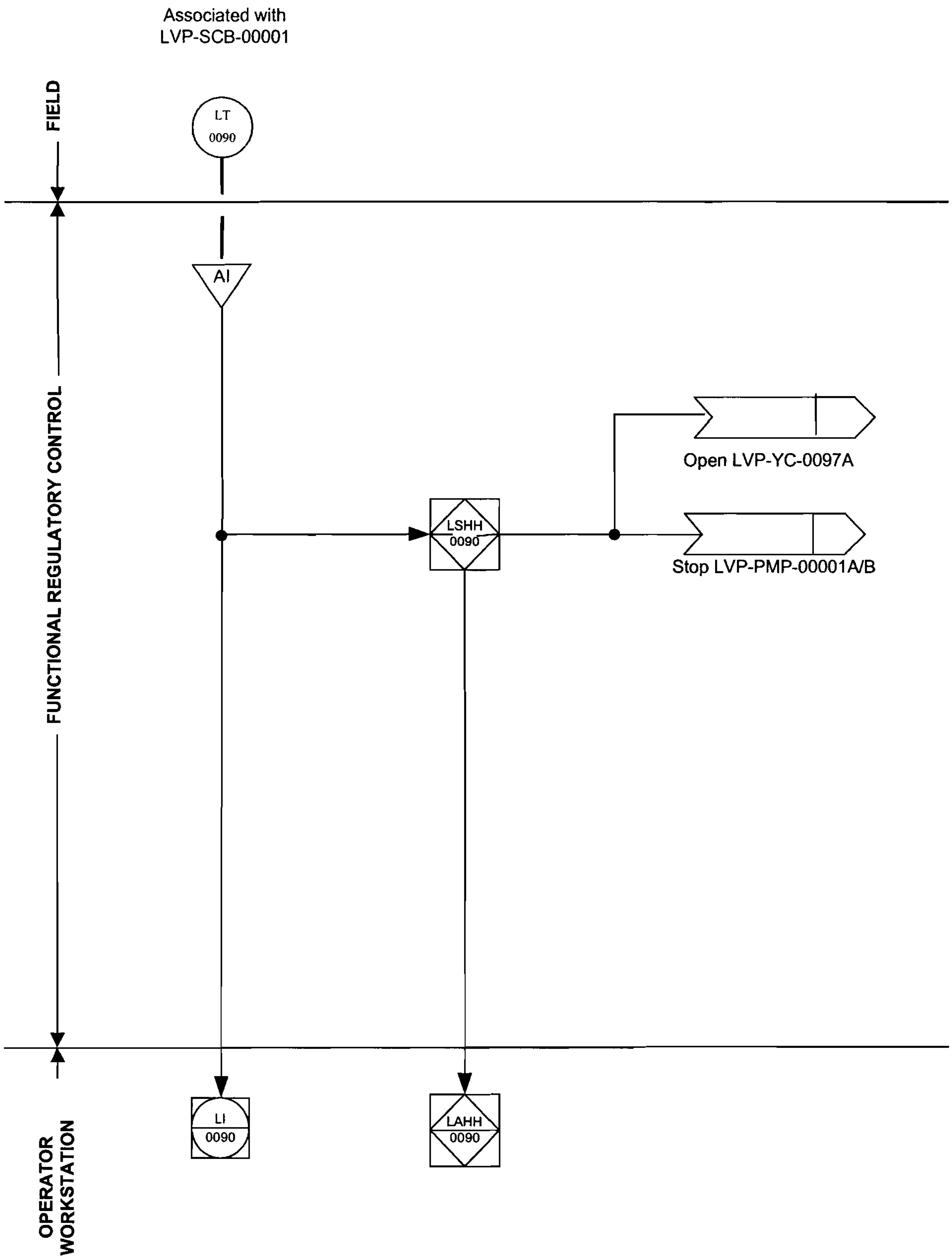
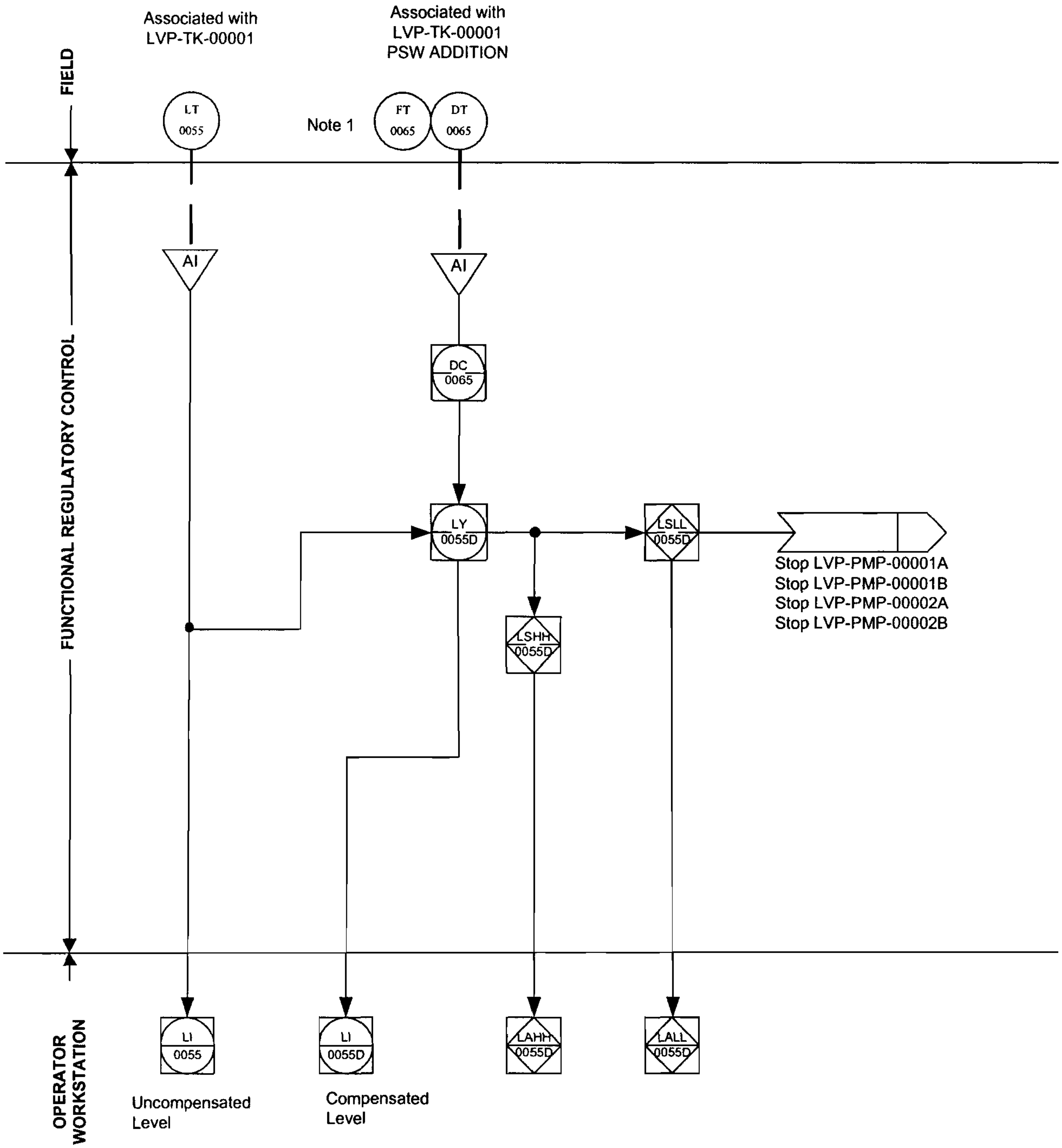


Figure 2 LVP-LT-0055 for LVP-TK-00001



Notes:

1. Multivariable transmitter; FT shown for reference only.

Attachment 51 – Appendix 9.18
Low Activity Waste Building
Operating Documents

Where information regarding treatment, management, and disposal of the radioactive source, byproduct material, and/or special nuclear components of mixed waste (as defined by the Atomic Energy Act of 1954, as amended) has been incorporated into this permit, it is not incorporated for the purpose of regulating the radiation hazards of such components under the authority of this permit and chapter 70.105 RCW. In the event of any conflict between Permit Condition III.10.A. and any statement relating to the regulation of source, special nuclear, and byproduct material contained in portions of will must prevail.

Additional appendices will be added to this appendix as new information is incorporated into this permit.

Drawings and Documents

Attachment 51 – Appendix 9.18

Low Activity Waste Building
Operating Documents

The following drawings have been incorporated into Appendix 9.18 and can be viewed at the Ecology Richland Office. See Appendix 7.18 for operating documentation common to the Pretreatment, LAW, HLW, and Laboratory buildings. **New drawings are in bold lettering**.

Drawing/Document Number	**Description**
24590-LAW-PER-PR-03-001, Rev 2	**LAW Vit Offgas System Bypass Analysis**
RESERVED	RESERVED

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RPP-WTP PDC

Document title: **LAW Vitrification Offgas System Bypass Analysis**

Contract number: DE-AC27-01RV14136

Department: Process Engineering

Author(s): R Hanson

Principal author signature:

Document number: 24590-LAW-PER-PR-03-001, Rev 2

Checked by: J Rouse

Checker signature:

Date of issue: 9 May 2007

Issue status: Issued for Permitting Use

Approved by: B Voke

Approver's position: Mechanical & Process Engineering Discipline Supervisor

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0	28 January 2004	Issued for Permitting Use	T Anderson
1	7 February 2005	Updated and Issue for Permitting Use	R Hanson
2	9 May 2007	Updated section 4.5, 4.6 and Figure 1	R Hanson

Contents

Figures

Acronyms and Abbreviations

AEA	*Atomic Energy Act of 1954*
COx	Carbon Dioxide / Carbon Monoxide
DOE	US Department of Energy
HEPA	high-efficiency particulate air
LAW	low-activity waste
NO_x	nitrogen oxides
SBS	submerged bed scrubber
SCR	selective catalytic reduction
VOC	volatile organic compound
WESP	wet electrostatic precipitator

1 Introduction

The two low-activity waste (LAW) melters process mixed waste in a joule-heated ceramic melter to reduce volume and immobilize radionuclides. The resulting offgas is treated in a manner that protects human health and the environment using a variety of unit operations that may, under specified circumstances, be bypassed. A bypass is defined as the intentional omission of one or more offgas treatment steps either as an automated part of system responses or manually. Bypasses are designed into the LAW vitrification offgas system to:

- Allow maintenance of treatment equipment without stopping melter ventilation
- Maintain a ventilation path to the facility stack
- Prevent and/or minimize melter pressurization

This document describes the LAW vitrification offgas system and potential bypass events in accordance with Dangerous Waste Permit Condition III.10.H.5.c.ix (WA7890008967).

2 Applicable Documents

Process flow diagrams associated with the LAW melter offgas system are as follows:

- 24590-LAW-M5-V17T-P0004, *Process Flow Diagram - LAW Vitrification Melter 1 (System LMP & LOP)*
- 24590-LAW-M5-V17T-P0005, *Process Flow Diagram - LAW Vitrification Melter 2 (System LMP and LOP)*
- 24590-LAW-M5-V17T-P0007, *Process Flow Diagram - Melter 1 Primary Offgas Treatment System (System LOP)*
- 24590-LAW-M5-V17T-P0008, *Process Flow Diagram - Melter 2 Primary Offgas Treatment System (System LOP)*
- 24590-LAW-M5-V17T-P0010, *Process Flow Diagram - LAW Vitrification Ammonia & Secondary Offgas (System AMR & LVP)*
- 24590-LAW-M5-V17T-P0011, *Process Flow Diagram - LAW Vit Secondary Offgas Treatment (System LVP)*

Other Documents

- WA7890008967, *Dangerous Waste Portion of the Hanford Facility Resource Conservation and Recovery Act Permit for the Treatment, Storage, and Disposal of Dangerous Waste,* Chapter 10, and Attachment 51, "Waste Treatment and Immobilization Plant."

3 System Summary

The offgas treatment system is designed to accommodate a LAW melter glass production rate of 15 metric tons per day per melter based on the concentrated LAW feed received from the pretreatment facility. Figure 1 schematically depicts the melter offgas system.

The primary offgas treatment system is designed to control the melter pressure, remove heat from the melter offgas, and remove particulates. The system, in conjunction with the exhausters, is designed to accommodate intermittent offgas increases up to seven times the normal steam and three times the normal noncondensable gas generation flow from the melter feed.

The vessel vent header receives offgas from the LAW concentrate receipt vessels (LCP-VSL-00001/2), the melter feed preparation vessels (LFP-VSL-00001/3), the melter feed vessels (LFP-VSL-00002/4), the plant wash vessel (RLD-VSL-00003), the submerged bed scrubber (SBS) condensate collection vessel (RLD-VSL-00005), and the C3/C5 drains/sump collection vessel (RLD-VSL-00004). The offgas received through the vessel vent system consists primarily of air, water vapor, and minor amounts of aerosols generated by the agitation or transfer of vessel contents.

Offgas from the vessel vent header is combined with offgas from the primary systems and routed to the secondary offgas system where the combined offgas is treated to destroy or remove hazardous contaminants. The system also removes potential catalyst poisons that could impair effectiveness of the catalyst treatment unit. After treatment, the offgas is released through a stack.

The primary offgas system consists of the following:

- Primary offgas line with film cooler (LOP-FCLR-00001/3)
- Melter control air
- Submerged bed scrubber (LOP-SCB-00001/2)
- SBS condensate vessel (LOP-VSL-00001/2)
- Offgas piping, valves, pumps, and instrumentation
- Wet electrostatic precipitator (WESP) (LOP-WESP-00001/2)
- Standby line (from the melter to its associated SBS) with
  - Film cooler (LOP-FCLR-00002/4)
  - Butterfly valve
  - Special relief device

This system cools the offgas and removes particulates. A separate primary offgas system is provided for each melter. Changes in gas generation rates affect the melter vacuum, which is controlled by adjusting the flow of control air introduced through the film cooler. The standby line is provided in the event that flow through the primary line is not sufficient to maintain the melter at the desired vacuum. This standby line includes a film cooler and has a butterfly valve as the isolation device. A special relief device between the melter and the butterfly valve in the wet process cell relieves melter pressure at about +10 in. water gauge.

The secondary offgas system consists of the following:

- Melters offgas HEPA preheaters (LVP-HTR-00001A/B)
- Melter offgas HEPA filters (LVP-HEPA-00001A/B, 2A/B and 3A)
- Melter offgas exhausters (LVP-EXHR-00001A/B/C)
- Mercury mitigation equipment skid (LVP-SKID-00001) consisting of the following:
    - Offgas mercury adsorbers (LVP-ADBR-00001A/B)
- LAW catalytic oxidizer/reducer skid (LVP-SKID-00002) consisting of the following:
    - Melters secondary offgas cat. oxidizer heat recovery exchanger (LVP-HX-00001)
    - Melters offgas cat. oxidizer electric heater (LVP-HTR-00002)
    - Melters offgas cat. oxidizer VOC catalyst (LVP-SCO-00001)
    - Melters offgas cat. oxidizer SCR catalyst (LVP-SCR-00001)
- Ammonia/air dilution skid (LVP-SKID-00003)
- Melters offgas caustic scrubber and caustic collection tank (LVP-SCB-00001 and LVP-TK-00001)
- Piping, valves, pumps, and instrumentation

This equipment removes most of the remaining particulates and removes or destroys chemical contaminants.

The vessel vent system consists of a header with lines to process vessels to maintain a slight vacuum that controls emissions both during normal operation and during maintenance.

4 Description of Bypass Events

The following six unit operations perform destruction or removal functions:

1. Submerged bed scrubber
2. Wet electrostatic precipitator
3. HEPA filters
4. Mercury mitigation equipment
5. Catalytic oxidizer/reducer skid
6. Caustic scrubber

With the exception of the HEPA filters, each unit operation can be intentionally bypassed for maintenance. The mercury mitigation equipment, catalytic oxidizer/reducer skid and the caustic scrubber may be bypassed automatically if high differential pressure across the unit is detected. The mercury mitigation equipment may be bypassed automatically if there is an indication of a carbon bed fire. In the event of melter pressurization, the butterfly valve in the line from the standby film cooler is interlocked to open to provide an alternate path.

The melter is enclosed in a shielding box that is separately ventilated via the C5 ventilation system. The C5 system ventilates areas known to be contaminated. If the melter pressurizes with respect to the annulus, offgas leaking from the melter plenum to the annulus bypasses treatment steps except for C5 HEPA filtration. The special relief device in the wet process cell can also act as a bypass since venting to the wet process cell bypasses treatment steps except for C5 HEPA filtration. There are a total of six bypass events as described below.

All bypass events are preceded by, or followed by, the termination of melter feeds. In the case of a manually initiated bypass, the melter feed is terminated, the cold cap dissipated, and emissions allowed to decline to acceptable levels before the bypass is activated. In the event of melter pressurization, special relief device operation, or interlocked bed bypass, the melter feed would terminate and the cold cap would dissipate as a result of the event.

Each bypass is numbered in Figure 1 to correspond with the sections below.

4.1 Submerged Bed Scrubber/Wet Electrostatic Precipitator Maintenance Bypass

This maintenance bypass connects the standby offgas lines for both melters. It would be used if maintenance needs to be performed on a SBS or a WESP. This is an unlikely event because no routine maintenance is planned, and it is anticipated that the SBS and WESP will be inspected and refurbished, if required, during melter changeout. To use this bypass, both melters are idled, the bypass is opened, the butterfly valve in the offgas train that is not to undergo maintenance is opened, and the isolation valve downstream of the WESP on the system to undergo maintenance is closed. No treatment steps are bypassed for offgas from either melter. This bypass is not expected to result in increases in the environmental discharge of dangerous constituents to the environment.

4.2 Mercury Mitigation Equipment Bypass

This bypass is primarily intended to operate if a fire is detected in the mercury mitigation equipment. Detection of a fire (i.e., increase in COx concentration) or potential fire initiator (i.e., high inlet temperature) would automatically open the bypass to prevent blocking the offgas flow path and close the inlet valves to reduce oxygen to the fire. Feed to the melters would be interlocked to stop at this point. Additionally, if high differential pressure across the unit indicates plugging, this bypass would be activated to avoid melter pressurization and release of offgas into the C5 area of the building. Again, feed to the melters would be interlocked to stop at this point. The bypass could be used when changing out adsorption media, but this would not be necessary because a valving arrangement is provided to allow using just one of the two beds while the other is undergoing maintenance. The melter in normally idled before the unit undergoes maintenance. The automated bypass event would result in slight increases in the discharge of acid gases and mercury until the dissipation of the cold caps is complete.

4.3 Catalytic Oxidizer/Reducer Skid Bypass

This bypass is intended to operate if high differential pressure across the unit indicates plugging. This bypass would be activated to avoid melter pressurization and release of offgas into the C5 area of the building. Again, feed to the melters would be interlocked to stop at this point. This bypass will also be used to change out catalyst. In preparation for this, the melters would be idled and offgas generation allowed to abate. The bypass might also be used for maintenance on the heat recovery exchanger or the electric heater. The automated bypass event would result in slight increases in the discharge of VOCs and NOx until the dissipation of the cold caps is complete.

4.4 Caustic Scrubber Bypass

This bypass is intended to operate if high differential pressure across the unit indicates plugging. This bypass would be activated to avoid melter pressurization and release of offgas into the C5 area of the building. Again, feed to the melters would be interlocked to stop at this point. Use of this bypass is not expected to be routine because this unit has no routine maintenance associated with it that would require bypassing. In the unlikely event that the packing needs to be cleaned or replaced, the bypass will be used after idling the melters. The automated bypass event would result in slight increases in the discharge of acid gases until the dissipation of the cold caps is complete.

4.5 Melter Pressurization

The standby offgas line supplements control of the melter plenum pressure under high offgas surge situations or if there is a blockage in the main offgas line to the submerged bed scrubber. The melter plenum pressure is controlled at a sufficient vacuum set point relative to the melter cave to avoid contamination release to the melter cave, prevent inadvertent glass pour, and prevent damage from occurring to the primary treatment system. This is accomplished by providing an alternate path by way of the standby offgas line for melter offgas. The standby offgas line is identical in size to the primary offgas line and runs for the same length from the melter to the submerged bed scrubber.

The standby line will normally be isolated from the SBS via a valve. At a low vacuum set point, this valve will automatically open, providing an additional or alternative (if the primary is restricted) path for the melter offgas to flow. The standby offgas pipe extends to the bottom of the submerged bed scrubber packed bed, identical to the primary pipe. Thus, during melter surges the cross-sectional area available for offgas flow effectively doubles, decreasing the pressure drop between the melter and the submerged bed scrubber and helping to reestablish normal melter vacuum. In case of a plug or restriction in the primary offgas pipe between the melter and the submerged bed scrubber, the standby line and valve would activate, allowing melter pressure control to be maintained. Once the cause of the standby valve being activated is rectified, the valve would be closed by operator initiation returning all of the melter offgas to the primary offgas film cooler and offgas pipe. An air purge will be used to keep the standby offgas line clean and prevent blocking.

The standby offgas jumper is automatically activated based on the melter plenum vacuum via a pressure controls interlock. Activation of the standby jumper is most likely to occur under melter feeding conditions and during an upset condition (i.e., melter surge). No loss of offgas abatement occurs upon activation of the standby jumper since the offgas is routed to the same destination (i.e., the SBS) as the primary offgas jumper.

In the unlikely event that an offgas surge exceeds the capacity of the melter offgas pressure control system, and the melter pressurizes with respect to the annulus, outleakage from the melter will bypass treatment steps except for the C5 HEPA filters (4.5a on figure 1). These events / surges are smaller than those that would open the special relief device discussed below. Feed to the melter is interlocked to stop before the melter pressurizes. Air and water to the film coolers are also interlocked to stop and the standby line is interlocked to open before melter pressurization occurs. This bypass event will result in melter offgas being discharged with only HEPA filtration during the period the melter is pressurized. This automated bypass event would result in slight increases in the discharge of acid gases, VOCs, NOx and mercury until the dissipation of the cold caps is complete.

4.6 Special Relief Device Operation

An even more unlikely event is one where an offgas surge exceeds the capacity of the melter offgas pressure control system to a pressure higher than the situation discribed above. In this situation the special relief device would open. If the special relief device on the standby line in the wet process cell opens, vented gas bypasses treatment steps except for C5 HEPA filtration. Note that the special relief device is intended to limit melter pressurization. Feed to the melter is interlocked to stop before the melter pressurizes. Air and water to the film coolers are also interlocked to stop and the standby line is interlocked to open before melter pressurization occurs. This bypass event will result in melter offgas being discharged with only HEPA filtration during the period the melter is pressurized. The special relief device closes when the line pressure drops below the set point.

4.7 Loss of LAW Facility Power

If power to the LAW facility is lost, the melter could pressurize if the following automatic actions are not completed. Feed to the melter is interlocked to stop on loss of power. Air and water to the film coolers are also interlocked to stop and the standby line is interlocked to open before melter pressurization occurs. This bypass event will result in melter offgas being discharged with only HEPA filtration during the loss of power event until the cold cap is dissipated. Additionally, the mercury mitigation equipment, catalytic oxidizer/reducer skid and caustic scrubber bypasses open to avoid/reduce the release of offgas into the C5 areas of the building. This is a safety requirement to direct NOx gasses out of building to avoid worker exposure. This automated bypass event would result in slight increases in the discharge of acid gases, VOCs, NOx and mercury until the dissipation of the cold caps is complete.

5 Recommendations

Recommendations for preventing the potential for bypass events as well as minimizing their impact and frequency are as follows:

1. Operating procedures: Operating procedures have not been written, but the need to avoid melter pressurization for safety reasons is well documented and there is a large safety focus on the prevention of melter offgas release to occupied areas. The description of procedures will be addressed in accordance with Permit Condition III.10.H.5.c, as appropriate.
2. Maintenance procedures: Maintenance procedures have not been written, but maintenance involving a bypass will not be performed on the offgas system unless the melters are properly idled.
3. Redundant equipment: The HEPA filters have redundant trains. Other treatment systems are not expected to have frequent maintenance and generally have slow and readily detected failure modes. The six pumps in the system each have an installed spare (total of 12 pumps). The exhausters are three 50 % units, two of which are normally in operation and one that is a spare. One exhauster can vent the melters although with a lower capacity to adjust to changes in offgas rates.
4. Redundant instrumentation: Each of the automatic bypasses has redundant instrumentation. Additionally the melter pressurization control has redundant pressure transmitters. The interlock for feed termination is through the safety class Programmable Protection System.
5. Alternate equipment: The offgas system has been extensively analyzed to optimize equipment. Alternatives considered are documented in best available radionuclide control technology, best available control technology, and best available control technology analysis for toxic air pollutants reports. The annulus around the melter provides additional capacity to avoid worker exposure to hot, toxic, corrosive, and radioactive materials.
6. Alternate materials of construction: The materials of construction for offgas equipment were selected based on bounding process conditions. These include exposure to high temperatures, corrosive gases and liquids, and erosion. Materials of construction were selected in a formal process that included

recommendations from material specialists and documentation of the selection of appropriate materials.

6 Conclusion

Bypasses are designed into the offgas system to allow maintenance of equipment without preventing the primary task of venting the melters and controlling melter plenum pressure. The automated bypasses around the mercury mitigation equipment, catalytic oxidizer/reducer skid and caustic scrubber perform an additional safety function of maintaining a flow path to the top of the stack. Three other bypasses can occur as a result of limiting melter pressurization during an upset condition as described in sections 4.5, 4.6 and 4.7.

The primary driver for the offgas system design has been safety, followed by an environmentally compliant discharge. Every effort has been made to avoid bypass events that would challenge either of these goals. All bypass events are either preceded by the termination of melter feed and cold cap dissipation or interlocked to achieve the same result.

Figure 1 Melter Offgas System